Vol. XXIX NOVEMBER 1935 Number 11

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FOUNDED 1905

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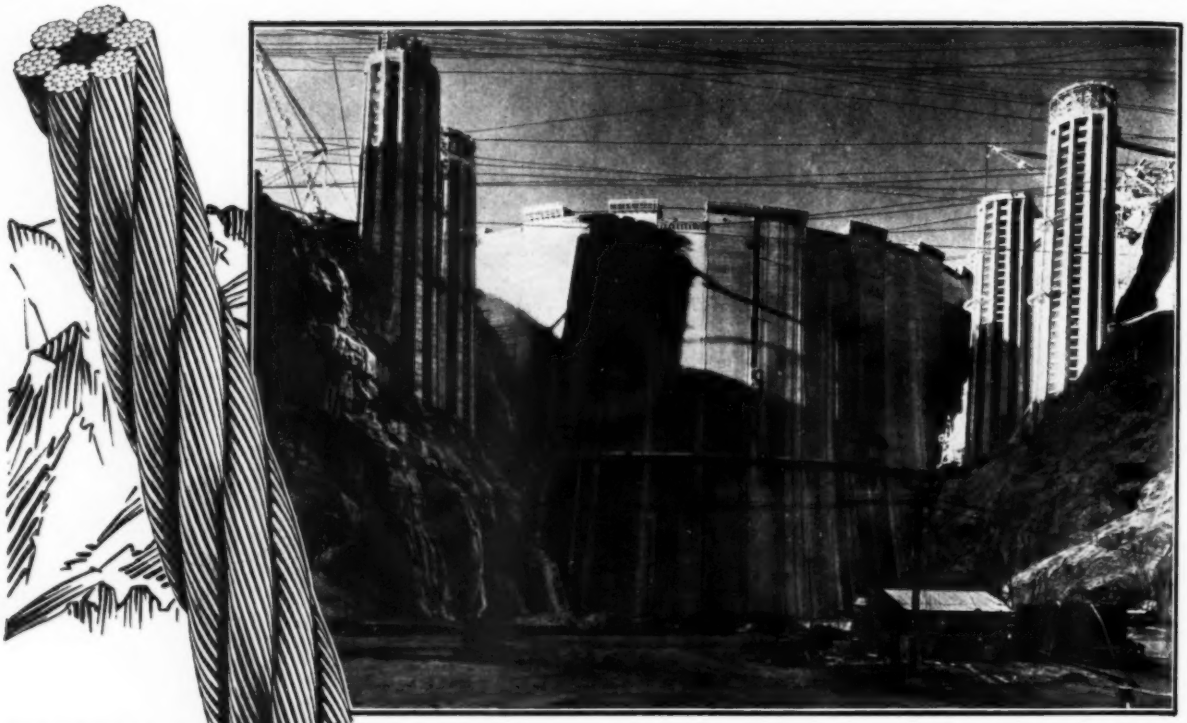

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PUBLISHED MONTHLY
FOUNDED IN 1905

EXCAVATING ENGINEER

DEVOTED EXCLUSIVELY
TO EXCAVATION

About Excavating Projects — By Excavating Men — For Excavating Men — The World Over

Vol. 29 NOVEMBER, 1935 No. 11

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Handy on Sewer Work ..... **Front Cover**

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Looking Ahead

These interesting articles will appear in early issues of Excavating Engineer. Watch for them!

Building Fort Peck Dam.

Dredging operations for the earth fill core, diversion tunnel construction, and the excavation for the spillway will be presented in a series of articles starting in an early issue.

Building Wheeler Dam.

Excavation for the foundation of TVA's $23,000,000 dam project on the Tennessee River, now two-thirds completed, involved the removal of 570,000 yards of rock.

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F. O. WYSE
Managing Editor

ARNOLD ANDREWS
Editor

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E. M. HEUSTON
Advertising Manager

E. T. OBENCHAIN
Assistant Editor

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When conditions tie-up other equipment

. . . LINN CARRIES ON

LINNS working on the Orondo-Pine Canyon Road, Douglas Co., Washington . . . Lidral Construction Company.

Here's another case where LINN haulage carried on and made money every day . . . even on days when heavy rains kept other haulage equipment idle. "We use LINNS under many conditions," writes Mr. J. F. Lidral, "even during the wet weather when use of other equipment is impossible. And we use them in sand and in places where it would be necessary to lay planking for other equipment. Even under extremely dry conditions they perform equally well. The body size makes it easy to handle large rocks and their sturdiness enables them to withstand a lot of necessary abuse. And upkeep costs are favorable with those of other equipment." Mr. Lidral emphasizes many of the advantages of LINN haulage. But there are others, too, which will help cut costs and increase profits on every job. Let us send all the facts.

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WHICH CONTROL for Your Motors?

GENERAL ELECTRIC presents these typical examples from its complete line of control equipment for every type of electric motor. Each does an outstanding job of starting and protecting — each is the *right* control for such applications as those mentioned below.

G-E specialists will gladly work with you to select the correct control equipment for your motors—controls that will protect your men and your motors.

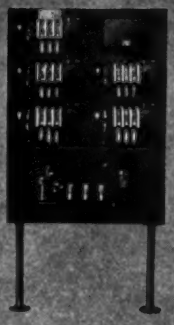
An installation of the right G-E motors, control, and wire and cable is a money-saving combination unbeatable in efficient operation, low maintenance, and long life. Write or call the nearest G-E office, or General Electric, Dept. 6 -201, Schenectady, N. Y.

FOR SQUIRREL-CAGE INDUCTION MOTORS

For full-voltage starting, here's a low-cost, high-quality magnetic switch for general-purpose service. Sizes up to 1200 horsepower are available

For reduced-voltage starting, also for safe, smooth starting of high-inertia loads, use the manual reduced-voltage starter

FOR WOUND-ROTOR INDUCTION MOTORS

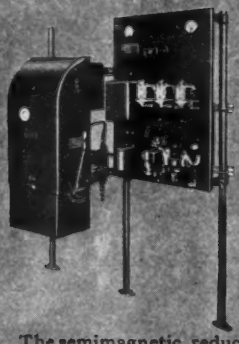


Automatic-control panels of this type are ideal for starting motors that drive pumps, fans, compressors, conveyors, or other high-inertia loads

The drum switch provides manual secondary control and is used, with a suitable resistor, for both starting and speed-regulating duty

FOR SYNCHRONOUS MOTORS

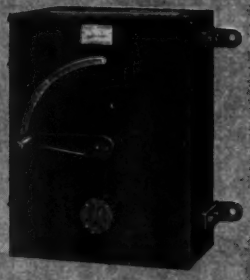
For automatic full-voltage starting of synchronous motors, use a magnetic controller of this type. For pushbutton or remote control



The semimagnetic, reduced-voltage starter is used where manual operation is satisfactory, and where low in-rush current is required

FOR DIRECT-CURRENT MOTORS

For your small constant- and adjustable-speed applications, d-c. magnetic controllers do a complete job of starting, protecting, and reversing



For speed regulation, use this manually operated rheostat—it makes motor speed adjustable between 50 and 125 per cent

THE RIGHT MOTOR FOR EVERY JOB—THE RIGHT CONTROL FOR EVERY MOTOR

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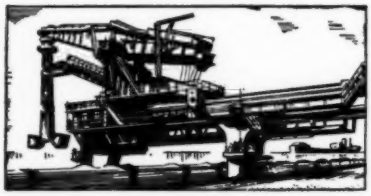

One of two Hulett Ore Unloaders operated by Ashtabula and Buffalo Dock Co., Toledo, O., owned by New York Central Railroad. Both unloaders are rigged with Roebling "Blue Center" Steel Wire Rope.

FOR SAFETY...USE ROEBLING "BLUECLAD" WIRE ROPE FITTINGS

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ROEBLING ...THE PACEMAKER IN WIRE ROPE DEVELOPMENT

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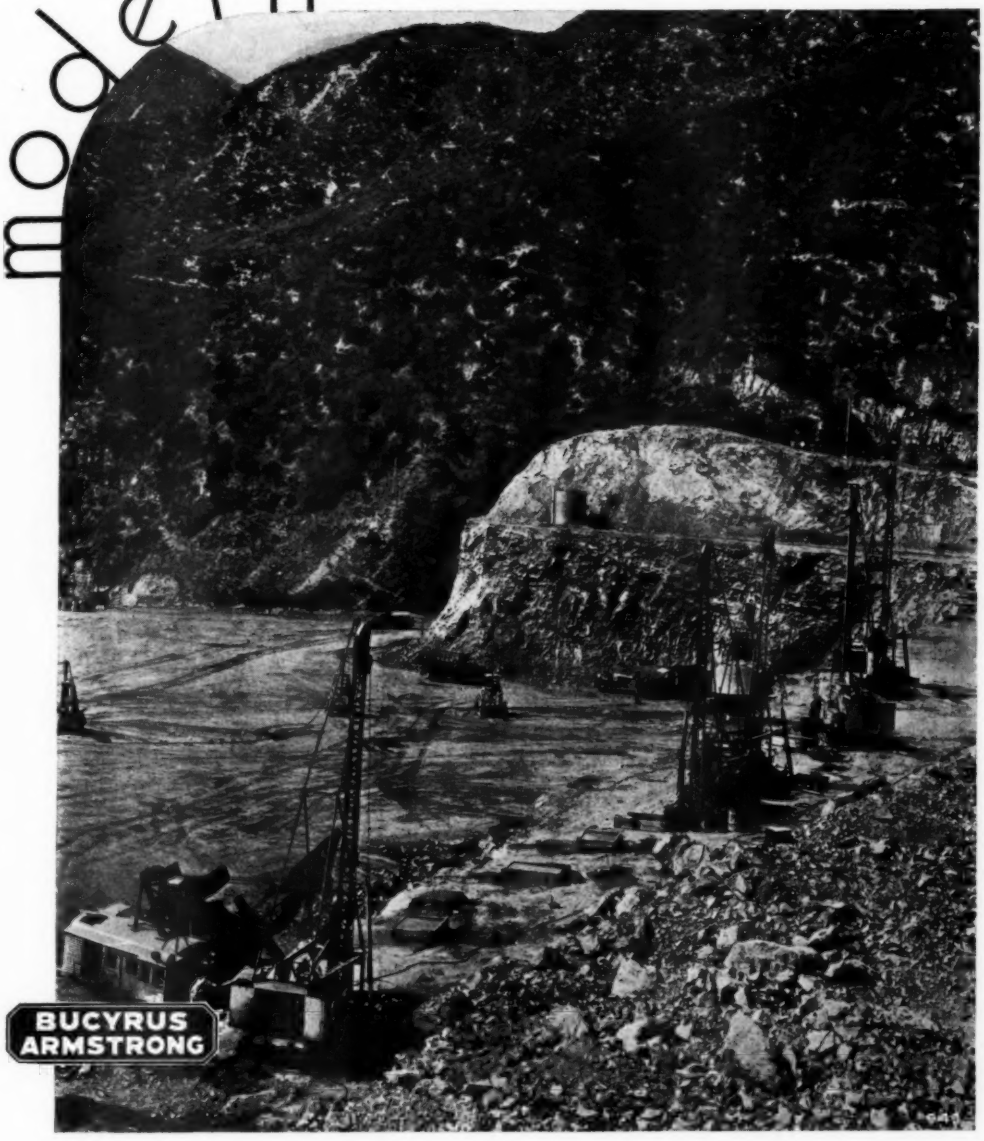
So simple is the churn drill principle, that many a venerable drill, ten, fifteen or twenty years old still puts down hole about as it did in Father's day. But if you were to compare these drilling costs with those of modern Bucyrus-Armstrong machines, you would realize that continued use of these antiques is a luxury you can ill afford under present-day conditions. Investigate the outstanding performance of up-to-date Bucyrus-Armstrongs.

modern



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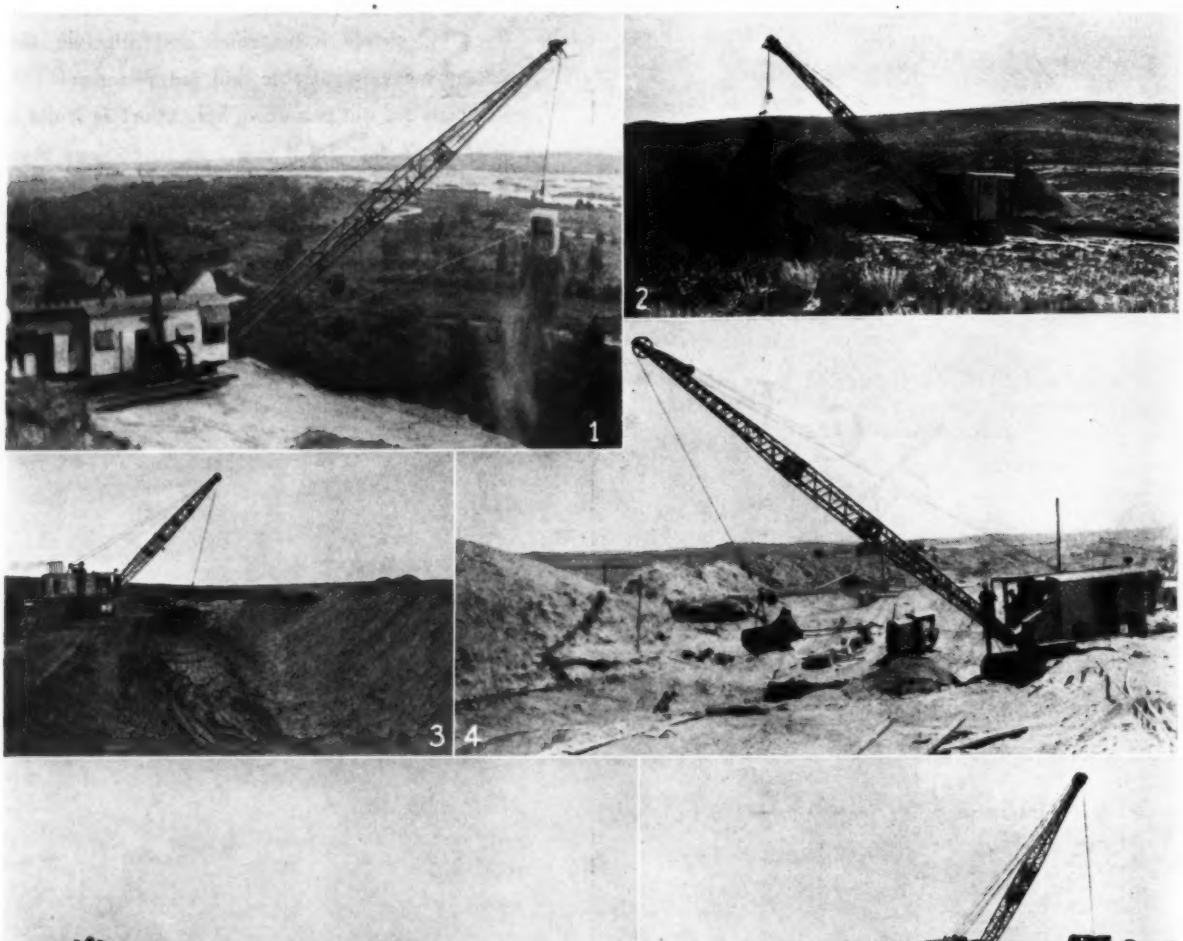

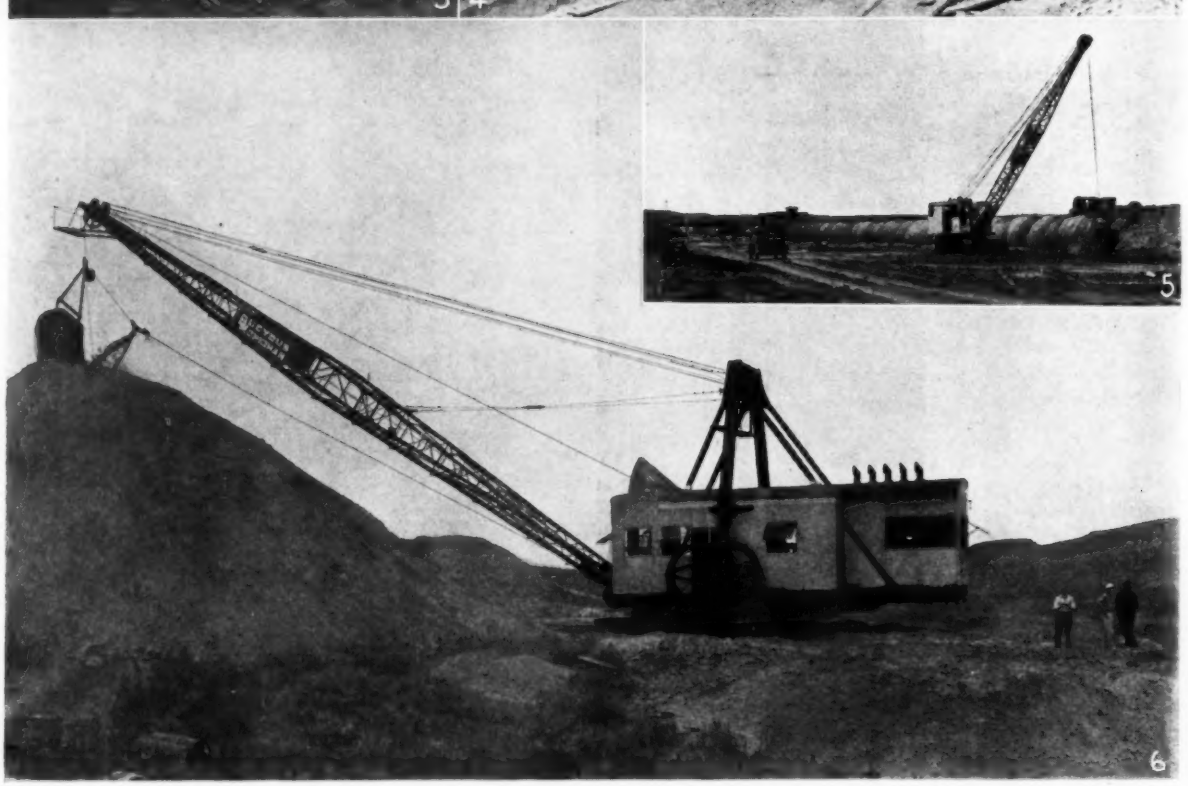

● *1. In hard digging all the time, J. A. Terteling & Sons 5-W dumps another bucketful of cemented clay over the bank. 2. Central Bridge & Construction Company uses the handy Bucyrus-Erie 1030 dragline on a small job of excavation for a culvert. 3. On Terteling's section near the reservoir, this Bucyrus-Erie 52-B dragline turns out 100,000 yards per month. 4. Central Bridge & Construction Company encounters underground water in excavating for the siphon across the bed of the South Platte River. Moretrench wellpoints, visible at the extreme left, and a couple of powerful pumps have no trouble keeping the trench dry. 5. A portion of the completed 7,000-foot siphon is shown here. The Koehring dragline in the right foreground is throwing a protective blanket of dirt over the siphon. 6. Working along the south bank of the North Platte River, Morrison-Knudsen's 5-W dragline moves up to 200,000 yards per month.*

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● *High spoil piles mark the progress of the dragline through the high ridge near Paxton on Hardwick's contract.*

Fast Digging On Sutherland's Big Ditch

Western Nebraska's $10,000,000 power and irrigation project, involving 16,000,000 yards of excavation, will be completed early next year

By **D. W. EVANS**

LONG BEFORE Nebraska's name was added to the roster of these forty-eight United States, North Platte was a terminal point for covered wagons westward bound. Situated at the junction of these two branches of the mighty river from which it gets its name, this now thriving metropolis has long had an interested finger in the flow of freight past its doors. Nowadays it is a focal point of prosperous southwestern Nebraska farms, bordering the North Platte River which brings precious water from the Tetons and Shoshone Range in Wyoming; and the South Platte which winds its way here from the Rockies above Denver.

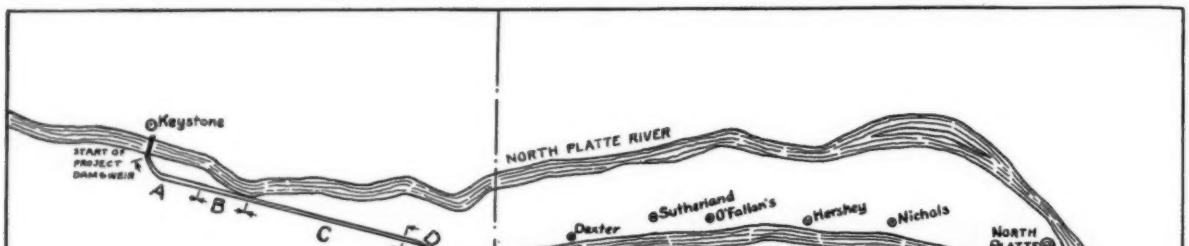
North Platte is vitally interested in a power and irrigation development now well under way, and which when completed will cost in the neighborhood of $10,000,000. It will furnish water to irrigate approximately 100,000 acres of productive farm land in the area, and will also develop electric power in two 18,500-hp. units and distribute it to North Platte and neighboring communities.

Taking its name from Sutherland, the town nearest the reservoir which will supply irrigation water, the Sutherland Project was made possible by a loan and grant totaling $7,500,000 by PWA.

A body known as the Platte Valley Public Power & Irrigation District, sponsors of the undertaking, maintains offices in North Platte, Paxton and Sutherland. Known as PWA Project No. 573, the job involves the excavation of more than 16,000,000 yards of dirt to create 65 miles of canal and two reservoirs, in addition to a dam across the North Platte River at Keystone, a siphon across the South Platte at Paxton, and a power house at the lower reservoir south of the city of North Platte.

Engaged on the canal, siphon, and reservoir construction phases of the project at present are six principal groups of contractors employing 24 draglines with combined bucket capacity of 57 cubic yards. Practically all these machines work night and day; four 6-hour shifts — to create maximum employment. Excavation is

● *Playing important parts in the construction of this $10,000,000 power and irrigation project, numerous Caterpillar tractors may be seen throughout the 65 miles of canal. The one shown here is leveling off the top of the spoil pile on Morrison-Knudsen's 7-mile section lying between the two rivers.*



A - Canal	3 mi.	700,000 cu. yds.	Morrison-Knudsen Co.	G - Reservoir	1½ mi.	1,200,000 cu. yds.	Condon & Ward; Condon & Babbitt; P. Kiewit & Sons
B - Canal	2 "	1,000,000 "	J. A. Terteling & Sons.				
C - Canal	7 "	1,500,000 "	Morrison-Knudsen Co.	H - Canal	19 mi.	4,300,000 cu. yds.	Morrison-Knudsen Co.
D - Canal	1½ "	2,200,000 "	Hardwick Contracting Co.	I - Reservoir	1 "	800,000 "	Condon & Kiewit
E - Siphon	1 "	800,000 "	Central Bridge & Const. Co.	J - Tail Race	2 "	800,000 "	Morrison-Knudsen Co.
F - Canal	14 "	2,100,000 "	J. A. Terteling & Sons.				

● *The extent of the Sutherland Project is shown in this sketch. A canal 65 miles long is being excavated to carry water from the diversion dam on the South Platte River near Keystone to the power house located near the junction of the two rivers a short distance from North Platte. Shown also is the location and yardage of each contractor.*

now proceeding at the rate of 1,700,000 cubic yards per month.

Tough Digging Encountered

Aided by the map which accompanies this article, let us make a swift trip down the line, to get a bird's-eye view of the entire project. Starting at the damsite at Keystone, and traveling eastward along the south bank of the North Platte River, we first encounter a 3-mile section of canal under contract to Morrison-Knudsen Company of Boise, Idaho. Sweeping along to the beetling bluffs which frown down on the shallow river, we next find a 2-mile stretch of the toughest digging on the entire project. Here J. A. Terteling & Sons of Boise, Idaho, are working high above the river in cemented clay.

Adjoining this stretch, a 7-mile section through sand and loam is being excavated by Morrison-Knudsen. At this point the canal leaves the North Platte and follows high ground southeast to the ridge at Paxton which separates the North and South Platte River Valleys. Siphon contracts and culverts here are being done by C. F. Lytle, Central Bridge & Construction Company, and Abel & Dobson.

● *A Caterpillar Diesel 40 with bulldozer, working on a 45° slope, smooths off the inner face of the reservoir embankment.*

Hardwick Has Heaviest Cut

The heaviest excavation on the entire project, 2¼ million yards in 1½ miles, is found on the next section of canal, where Hardwick Construction Company is cutting a channel through the ridge above Paxton. This section connects with a 7,475-foot siphon crossing the South Platte Valley, under the Lincoln Highway, the main line of the Union Pacific Railroad, and the South Platte River. Central Bridge & Construction Company of Wahoo, Nebraska, are building that part of the siphon actually beneath the South Platte River, while C. F. Lytle, Sioux

City, Iowa, is constructing the adjacent sections joining the siphon to the canal at either end.

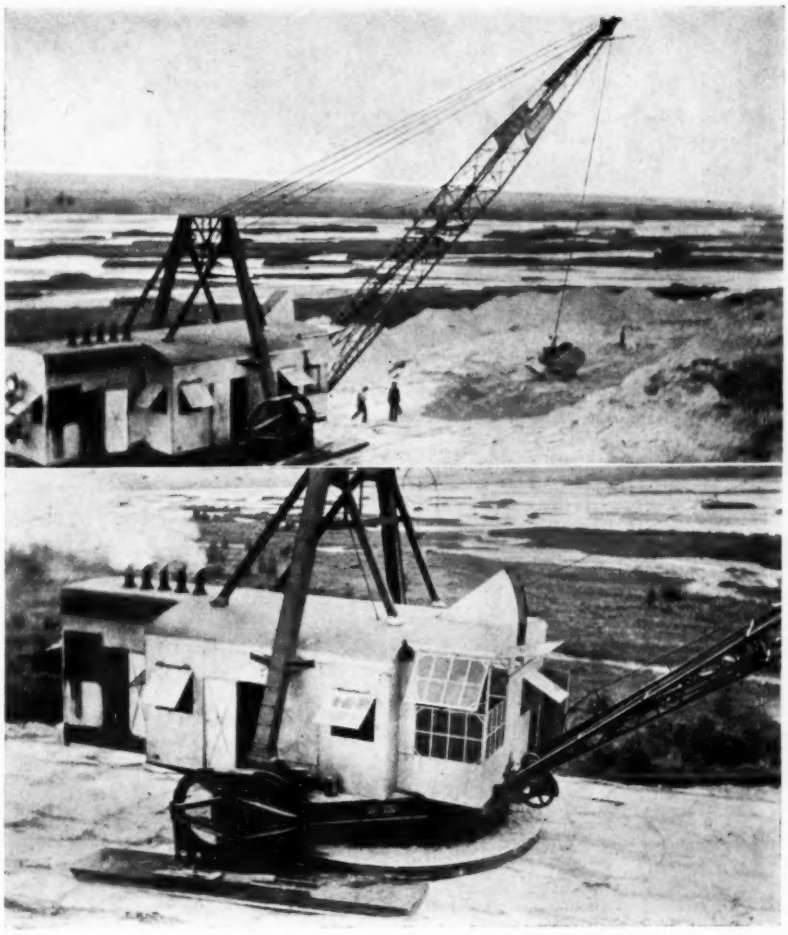
South of the South Platte, the canal, again under construction by J. A. Terteling, swings down through the rolling hills for 14 miles to the storage reservoir, immediately south of Sutherland. Flanked on the south by high ground, this reservoir involves construction of a dike around the other three sides, and short lengths of inlet and outlet canals. Earth moving is divided among three contractors: Condon & Babbitt, Condon & Ward, and Peter Kiewit Sons Company. Paving of the inner wall is handled by the general contractors on the reservoir: C. F. Lytle and Western Asphalt Paving Corporation.

Leaving this upper reservoir, the big ditch, cut through again by Morrison-Knudsen, travels 19 miles to the lower reservoir and power house. Hardwick & Horton, St. Louis, are constructing the 2-mile tailrace section. The lower reservoir is being constructed by Peter Kiewit & Sons Co., Omaha. The 65-mile trip down the canal being thus completed, it seems in order to retrace this path, examining the excavation methods and equipment in somewhat more detail.

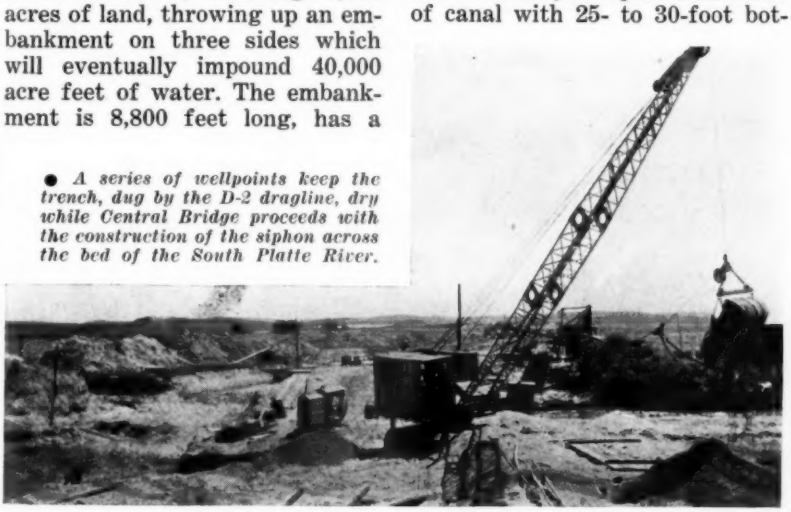
Elevating Graders Speed Reservoir Work

Using Caterpillar tractors, scrapers, fresnos, and elevating graders, Peter Kiewit & Sons have practically completed the lower reservoir, covering 1,600 acres of land, throwing up an embankment on three sides which will eventually impound 40,000 acre feet of water. The embankment is 8,800 feet long, has a maximum height of 45 feet, and is concrete faced. When the power house is completed this volume of water will provide some 105,000,000 kilowatt-hours of firm hydroelectric power, per annum.

Above and below this regulating reservoir, Morrison-Knudsen have virtually completed 21 miles of canal with 25- to 30-foot bottom and 1½ to 1 or 2 to 1 slope, depending on the nature of the soil through which the canal passes. A 2½-yard Link Belt K-55 dragline and a 3-yard P & H dragline, which handled between them substantial portions of the 5-million odd yards moved here, have been moved up to the upper end of the project on a 3-mile section involving 700,000 yards of excavation. Still on the last mile or two are another Link Belt 2½-yard dragline and a 5-yard Page dragline.



● *Top: At the change of shifts, the machine pauses for a few minutes while the oilers attend to their duties. Meanwhile operators Curry and Crowley look things over figuring out the best way to handle the tough digging encountered on J. A. Terteling's section of the canal which follows the bluff on the south bank of the North Platte River shown in the background. Below: Moving up with the Monighan is quickly and easily done. Its ability to step off into any direction enables it to walk easily around any deep washes or other obstacles encountered along the route of the canal.*



● *A series of wellpoints keep the trench, dug by the D-2 dragline, dry while Central Bridge proceeds with the construction of the siphon across the bed of the South Platte River.*

● *This fast digging machine turns out big yardages every month for Morrison-Knudsen on their 7-mile section bordering the North Platte River.*

Special Machines Used for Concreting

At the Sutherland Reservoir, a 1½-yard Bucyrus-Erie E-2 Diesel dragline is putting the finishing touches on the short length of outlet canal for Condon & Ward. This dragline and Condon & Babbitt's 1½-yard Northwest have handled much of the excavation on the 2,800,000-yard reservoir contract. A ¾-yard P & H dragline used by Peter Kiewit Sons has completed a short stretch of inlet canal. Most of the embankment has been thrown up by Caterpillar Diesel 40's hauling elevating graders, five of these machines being constantly on the move. With dirt in place to rough grade, the tractors, now equipped with bulldozers, are planing the inner side of the reservoir bank to a 1½ to 1 slope, preparatory to facing it with concrete. A batch plant has been set up near the center of the reservoir area, with a 1-yard Northwest clamshell machine to handle aggregates. This phase of the work—the paving—is handled by C. L. Lytle and Western Asphalt Paving Corporation in an interesting manner. Two especially built Northwests, one on top of the embankment and one below, handle between them a concrete bucket, functioning much in the manner of the head and tail tower of a tower excavator such as is used in levee work. As soon as the embankment is graded to slope, forms and reinforcing steel are set in place, and the two machines place concrete on the slope just where required.

Farmers Moved from Reservoir Boundaries

This upper reservoir, roughly oval in shape, will be 85 feet deep at its lowest point, and will impound 176,000 acre feet of water, 100,000 of which will be used to irrigate farms located between North Platte and Kearny which hitherto have been dependent upon natural rainfall, often far too scanty, for water for their crops. Several farms now within the reservoir area must necessarily be abandoned, and new buildings at acceptable locations will be erected for these farmers as part of the project.

The 14-mile length of canal between the upper reservoir and the big siphon involving the excavation of a little over 2 million yards, is being built by J. A. Terteling & Sons. Excavation here is handled by two Bucyrus-Erie 52-B Diesel draglines equipped with 60-foot booms and 3-yard buckets. Starting in February, 1935, these two machines had in five months placed more than half the yardage in the ditch banks. The general method of excavation used here is typical of that employed on all the canal: A pilot cut on one side excavates some-

(*Continued on page 530*)

● *Concrete is placed on the inner face of the reservoir wall by means of cableways suspended between the two special Northwest machines.*

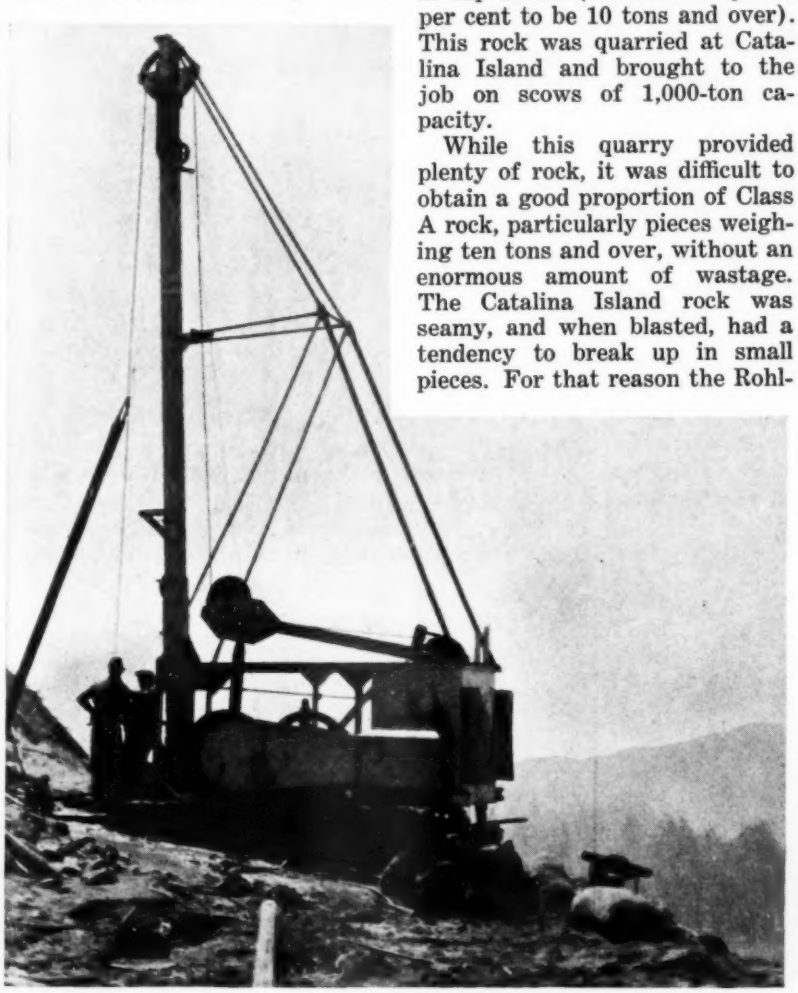
Blast-Hole Drill Increases Quarry Output

Rohl-Connolly Company obtains cap rock for new Los Angeles Harbor sea wall from the Riverside Quarry

By **JOHN R. MARCY**

THE CONSTRUCTION of the new 12,500-foot Los Angeles Harbor breakwater is proceeding rapidly and in accordance with the schedule established by the U. S. Engineers, with two sections, totaling 5400 feet, now in place. A third section, 2,000 feet long, was awarded last July to Rohl-Connolly Company, Los Angeles, for $827,750. This company also held the contract for the second section, completing it early in June.

An article in the March *Excavating Engineer* described the construction of the new sea wall, which was built with a clay-and-sand core pumped into place by hydraulic dredges operating in the harbor. This method of construction resulted in a considerable saving of rock, reducing the estimated cost almost 50 per cent.



● *High above the quarry floor, the Bucyrus-Armstrong drill keeps pounding away 2½ hours a day.*

New Quarry Supplies High Grade Granite

The second section, 4,000 feet long, required 320,000 yards of Class B stone (60 per cent weighing from one pound up to two tons) and 300,000 tons of Class A cap stone (1 ton and up—50 per cent to be 10 tons and over). This rock was quarried at Catalina Island and brought to the job on scows of 1,000-ton capacity.

While this quarry provided plenty of rock, it was difficult to obtain a good proportion of Class A rock, particularly pieces weighing ten tons and over, without an enormous amount of wastage. The Catalina Island rock was seamy, and when blasted, had a tendency to break up in small pieces. For that reason the Rohl-Connolly Company, after an examination of various limestone deposits which might be used for the production of Class A rock, took over the old Ormand quarry in West Riverside, some sixty miles east of Los Angeles.

This quarry was developed by the Hauser Construction Company in 1926 when that company was constructing a rock dike at Long Beach Harbor.

The rock, a high grade granite, is found on an isolated hill approximately a mile long, a quarter of a mile wide, and over 300 feet high. The quarry property covers about 450 acres of ground, and the present quarry face is now some 1500 feet in length. The quarry had lain idle from the time the Hauser Construction Company completed its contract several years ago until about the first of this year when Rohl-Connolly found it to their advantage to quarry Class A rock there.

Shovels, cranes, drills, and trucks were brought in and operations started under the direction of Superintendent O. C. Steves. The first thing was to clean up the quarry floor so that hauling could be done with trucks. The previous operation had involved the use of numerous spur tracks for loading directly to cars. Most of these old tracks were removed, stones and boulders cleared away, and the floor leveled to give good roadways for the trucks. The quarry face is about one-half mile from the main line of the Union Pacific across a nearly level plain.

Practically no stripping was necessary as the top soil covering

● *The Bucyrus-Erie 50-B shovel casts a huge Class A rock onto the bed of the Sterling truck.*

the 160 feet of solid rock ranges from six inches to a foot in depth.

Churn Drill Increases Quarry Output

At the start, Leyner drills were used, sinking 3-inch holes 30 to 35 feet deep horizontally or obliquely upwards into the face. These were chambered to receive 200 to 300 pounds of explosive. As the quarry face was from 145 to 160 feet high, these holes left a toe, or sloping base at the foot of the quarry face, and made further development difficult.

Last March, Rohl-Connolly purchased a Bucyrus-Armstrong Model 29 blast-hole drill, electric powered, and put it to work in the quarry. This blast-hole drill has an interesting history. It was shipped from the factory to the Rohl-Connolly Company for use on the El Capitan Dam. Later it was put into operation at the quarry on San Gabriel Dam No. 1 by the West Slope Construction Company. When work was suspended there about a year ago the drill, of course, became idle and was later re-sold to Rohl-Connolly Company, who moved it out to the West Riverside Quarry.

This drill sinks 8-inch holes down to about ten feet below the level of the quarry floor. The holes are put down about 50 feet back from the face and are about 25 feet apart. They are sprung with 80 per cent gelatine until the pockets are large enough to hold a charge of 3500 pounds, on an average, of free running dynamite. Usual blasting practice is to shoot from ten to twelve holes at a time. The explosive is set off by means of Cordeau fuse which in turn is fired by an electric blasting cap.

As an example of the results obtained with these blasting methods, one recent round of twelve holes, drilled to a depth of 155 feet, brought down approximately 84,000 yards of rock of which more than 40 percent was Class A rock.

When the drill was first put into operation, the output ran about 50 feet per 24-hour day. Since then, the drillers have been able to increase their output so they now put down 25 feet in an eight-hour shift. An average of around 60 feet a day is being maintained. This is considered good progress as the rock at the Riverside Quarry is exceptionally hard granite. It is interesting to note here that this same drill was

● *Top: The caps are stored in this building. Bottom: The large explosive magazine is well constructed and plainly marked. To the rear stands an old-time railroad type shovel now outdated by the modern full revolving shovel.*

able to make as much as 154 feet in a day while working at the quarry at San Gabriel Dam No. 1. That was because the rock there was of a softer formation.

Fred Williams, boss driller, is well pleased with the work of his men. Four crews, each consisting of one driller and helper, operate on a 24-hour a day schedule, each crew working five 8-hour shifts weekly. The schedule leaves one 8-hour shift dead, that from 12 o'clock midnight Sunday until 8 o'clock Monday morning.

Portable Powder Boxes Promote Safety

The explosive being used is Giant Quarry special No. 25 with occasional shots of black powder. The three-inch Leyner holes were sprung from six to seven times at one-day intervals, while with the eight-inch churn-drill holes, one springing is usually sufficient.

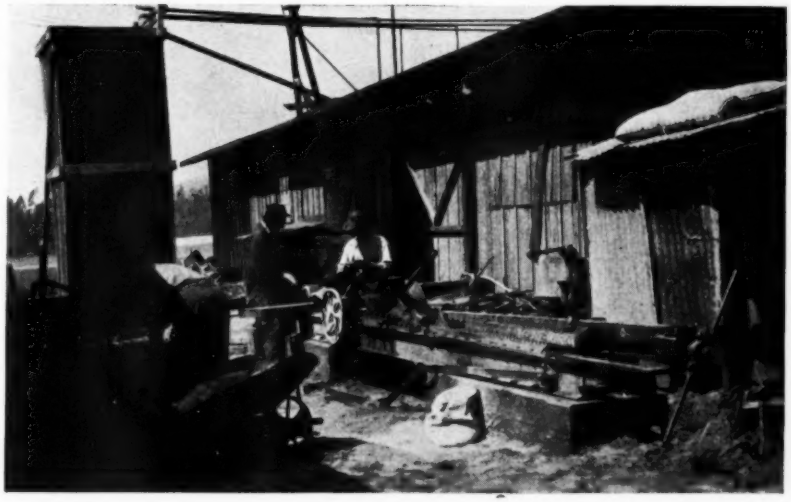
● *Superintendent O. C. Steves stands beside one of the portable powder boxes which he designed. These boxes hold a day's supply of powder for block-holing and springing making it unnecessary to run back and forth to the main magazine.*

The powder is purchased in carload lots of approximately 48,000 pounds. A state law in California requires that very little explosive be kept in the immediate vicinity of the quarry face, so Superintendent Steves designed small portable powder boxes to hold the explosives used each day on block-holing and for springing. The use of these boxes eliminates the necessity of running back and forth to the main magazine. Three of these are placed on the quarry floor near the jack-hammers, one is kept on top of the quarry face where the blast-hole drill is working. A light Ford pick-up truck is used to haul the powder from the magazines to the boxes.

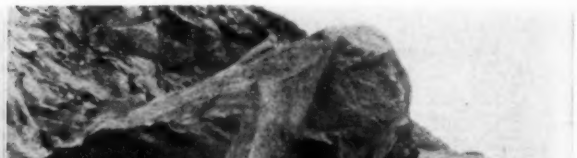
The rock in the Riverside quarry weighs 172 pounds per cubic foot or about 2¼ tons per cubic yard in the solid. A good feature about it is that much of it breaks out in large blocks which in turn are reduced to Class A size with very little wastage. Recently a blast broke out a rock having an estimate weight of approximately 5,000 tons. The jack-hammer crew with the aid of a little explosive soon reduced this to pieces of Class A rock from 10 to 30 tons in weight with little loss.

● *Ready for the switch engine to take them over to the main track, this string of flat cars, each carrying a load of 55 tons of Class A rock, wait in the loading yard.*

One day an energetic shovel operator loaded a 35-ton rock on a flat car. It was shipped along with the rest to the dock at Wilmington where the Class A rocks are transferred from cars to barges to be hauled out to the breakwater. However, the crane at the transfer dock lacked the necessary stability to handle such



● *The Bucyrus-Armstrong Model 8 bit dresser is in the process of being set up. With this machine, the blacksmith will find it easy to keep the driller supplied with plenty of perfectly gauged and sharpened bits.*



a large boulder. So the flat car and its load were sent back to the quarry with instructions to the jack-hammer men to break up the large rock. A few holes here and there in the rock, and the correct amount of explosive broke it in two pieces, and it was ready for another trip back to the dock without being taken off the car.

Rock Classified at Face

The blasted rock is loaded with two Bucyrus-Erie 50-B, oil-fired, steam shovels. The shovels do the classifying at the quarry face. They pick out the Class A rock, either by nosing it out with the dipper or by means of chain slings suspended from the dipper teeth. A Marion crane, electrically operated, also works at the face, and helps out in the classifying work. It picks up the pieces that are free and loads them directly to the flat bed trucks. With the Class A rock out of the way, the steam shovels dig into the Class B and load it to the dump trucks to be hauled to the stock piles.

The two shovels and crane keep four, flat-bodied trucks and three dump trucks busy. Extra trucks are kept in reserve so that more can be put to hauling Class B when necessary. In all, ten Sterling trucks are available for service, providing ample insurance against delay because of breakdowns.

The trucks, loaded with Class A rock, have only a short haul to reach the loading yard where the flat cars wait for their loads. Here another Marion electric crane transfers the rock from the trucks to the cars by means of a chain sling.

● *Left: At the loading yard, an electric crane transfers the stone from the trucks to flat cars. A heavy decking of railroad rails protects the chassis of the truck from the battering of the huge boulders. Right: This rock is estimated to weigh 5,000 tons.*

The whole operation moves along smoothly with as much as 2,000 tons leaving every working day. One day the production reached the point where 42 flat cars, each averaging around 55 tons a car, were shipped to Wilmington. At the loading dock, a stiff-leg crane with cable slings transfers the rock from the cars

● *Top: The Bucyrus-Erie 50-B steamer moves up a little closer to the face. Partially hidden by the dipper teeth, one of the jack-hammer men is drilling an extra large boulder. Center: The Marion electric crane swings a big Class A rock around to the truck, while nearby another one waits its turn. Bottom: A Lorain gas shovel does a variety of useful jobs around the quarry. Here it is digging a roadway up to the top of the face.*

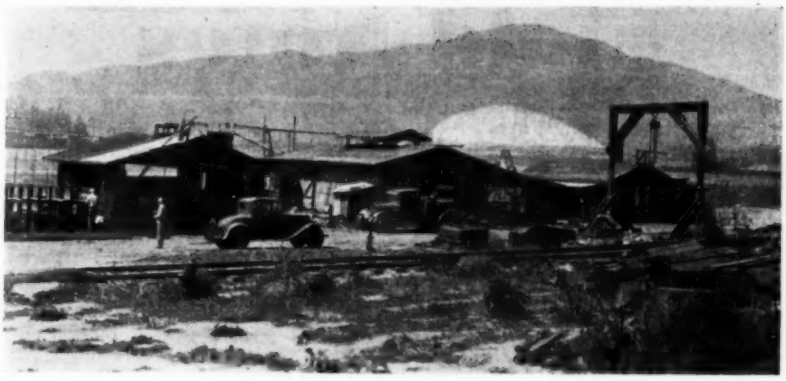
● *A view of the quarry operation from the top of the face.*

onto the 1,000-ton barges. The loaded barges are towed out to the breakwater where the rock is placed by a Class 24 Bucyrus-Erie steam crane.

Government inspectors pass on the rock as it is being transferred from the flat cars to the barges. Class A rock has to be one ton or over in weight with 50 per cent by weight to be 10 tons or over.

Bit Dresser Reduces Sharpening Time

At the quarry shop near the loading tracks, a Bucyrus-Armstrong Model 8 bit dresser takes care of sharpening the bits. In the hard granite at this quarry frequent changes of bits are necessary; as many as three or four in a single eight-hour shift. Before the bit dresser was installed, the drillers dressed their own bits on a hand forge at the rig. This, of course, took considerable time, and in addition, hand-dressed bits are never as uniform as machine-dressed bits. The bit dresser reduces the sharpening time very considerably and gives a more perfectly gauged and sharpened bit. Only one operator is required to handle the dresser. He has no trouble at all in keeping up a good supply of sharp bits, since it takes only thirty minutes to bring the bits to forging heat, and very little time to complete the sharpening and dressing operation. The bit dresser is electrically operated, being driven by a 15-hp. motor.

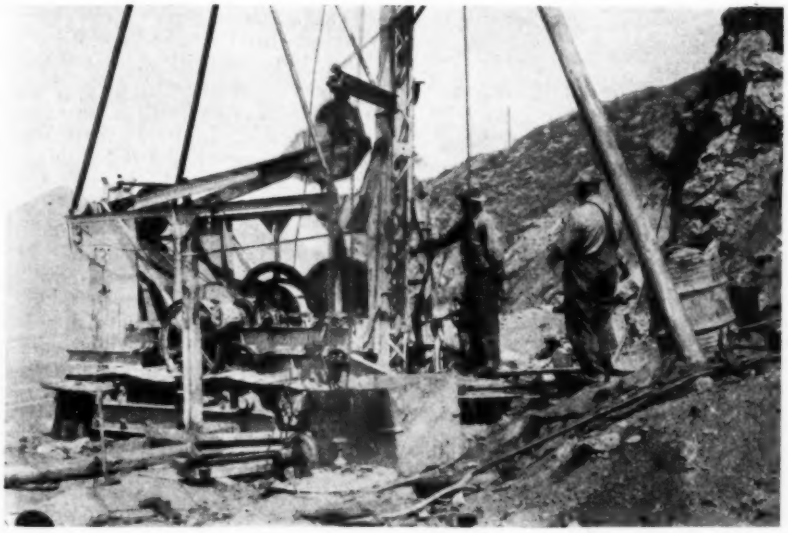


● *The shops are well equipped to maintain the shovels, trucks, and drills in good shape.*

New Row of Blast Holes Going Down

High above the quarry floor, a crew of men level off a bench for the next line of holes. The dirt and boulders are being cleared away so that a fairly level place will be ready for the Bucyrus-Armstrong blast-hole drill as it continues its job of sinking holes through the hard granite rock.

● *A new bench is being opened up on the crest preparatory to putting down a new row of blast holes.*



● *Working in the extremely hard rock encountered at Riverside, this heavy duty Bucyrus-Armstrong drill averages 60 feet of eight-inch hole a day.*

With the exception of the two steam shovels, the rest of the equipment of the quarry is electrically operated. The two cranes are powered by 75-hp. motors, and the electric drill has a 20-hp. motor. Water for the steam shovels is supplied by wells supplemented by water pumped in from an irrigation canal about three-quarters of a mile away. Fuel oil, purchased in tank car lots, is placed into a storage tank, and then pumped out to the shovels at the quarry face as needed.

The present operation involves the services of 98 men, including shop men, shovel runners and oilers, jack-hammer men, and drill operators. With the exception of the drilling operations, work is carried on in two shifts, the first, from 6 A. M. to noon, and second from 12:30 to 6:30 P. M., six days a week. As stated before the drill crews work 24 hours a day. Assisting Superintendent Steves in his task of getting out the rock for the breakwater are: T. C. Perry, quarry foreman; Frank Wilson, powder boss; Jack Hale, office man; and Joe Forrester, shovel mechanic and plant electrician.

The Fisherman

He riseth up early in the morning and disturbeth the whole household . . . mighty are his preparations . . . he goeth forth full of hope . . . and when the day is far spent, he returneth smelling of strong drink . . . and the truth is not in him.

Field Notes

Keeps Dust Down

ONE OF THE MOST dangerous hazards to traffic on gravel highways is the clouds of dust raised by moving vehicles. Many collisions and other accidents have occurred where the pall of dust raised by cars and trucks has been so great as to completely obscure the vision of passing or following motorists causing them to lose control of their cars.

The Washington State Highway Department is doing its bit towards minimizing this hazard by equipping its road maintaining units with dust laying apparatus. The first step consisted of equipping one of the Department's Four Wheel Drive road maintenance trucks with an underbody spray unit. The water supply is carried in an 850-gallon tank mounted on the truck frame and an even flow of water is assured to the underbody spray bar by means of a small power pump.

The idea for this installation was first conceived in July, 1934, and through the efforts of L. V. Murrow, State Director of the Department; Norman Hill, District Engineer and Percy Stanley, Master Mechanic of the Spokane District, it was put into service in June, 1935, on Pend O'Reille Highway between Spokane and the Canadian Border.

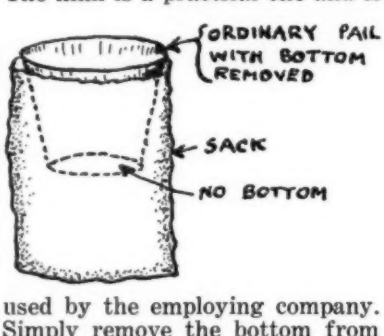
The FWD maintenance unit travels 146 miles per day and uses less than four tanks of water. It requires only three to four minutes to refill the tank.

Since this unit has been in operation, accidents due to dust hazards have been reduced approximately fifty per cent.

Sack Filling Kink

WHEN I was a boy, it was often my task to "hold sacks" while my father or someone else filled them. The sacks would continually sag and twist, making it difficult to fill as well as to hold them.

An excellent kink, developed by a bright young mechanic working in an Eastern manufacturing plant, is illustrated in the sketch. The kink is a practical one and is



used by the employing company. Simply remove the bottom from an ordinary metal pail, insert the pail in the sack as shown, holding the pail and sack simultaneously in the positions indicated. By this means the sack can be filled more easily and more quickly and the holding job becomes much easier. In fact, by setting up a post to hold the pail and using S-type wire hooks over the edge to hold the sack, one man can do all the work unassisted. The bottom of the pail is most easily cut off by means of an ordinary can opener.

—W. F. Schaphorst, M.E.

Protect Your Flashlight

FLASHLIGHTS equipped with reflector and lens larger than the battery tubes are often crushed or broken accidentally through contact with other objects in the tool chest or wherever they are kept when not in use. The rim of the octagon-shaped cap bends easily and the glass lens requires but little pressure to crack it.

Protection can be given the flashlight by stretching an ordinary, octagon-shaped, fruit jar cap tightener over the cap as shown

in the illustration. This device prevents damage in spite of hard bumps against nearby objects. This inexpensive household aid has the same shape as a cap rim with just enough difference in size to make a snug fit.

—Frank W. Bentley, Jr.

Liability for Damage Caused in Blasting

A SUBCONTRACTOR driving a tunnel under a street as part of a sewer improvement was not liable for injury done a nearby building, not having used excessive quantities of explosives nor having been otherwise negligent in doing the work. That is a thumb-nail statement of what the Kentucky Court of Appeals decided in the case of Williams v. Codell Construction Co., 69 S. W. 2d, 20.

Where the tunnel was constructed in front of plaintiff's house, it was 30 to 35 feet below the street surface. The face of the tunnel was 4½ feet wide and 5½ to 6 feet high. From 20 to 28 holes were drilled 6 feet deep in the face of the tunnel, and loaded with about 42 pounds of dynamite. About 6 cubic yards of rock and earth were pulled by each explosion. The holes were drilled in rows of four about 12 inches apart. The dynamite was so exploded that the rows, commencing at the bottom, were exploded at intervals of one or two seconds. Several experts testified that this method was a usual and reasonably careful one.

A jury found that the blasting was properly done and exonerat-

ed defendant subcontractor from liability. The trial judge gave a verdict in favor of defendant, and the Court of Appeals put its O. K. on the decision. The higher court said, in part:

"There is a conflict of authority" between the courts of the different states "as to whether one is liable, irrespective of negligence on his part, for damages to buildings belonging to others by blasting with powerful explosives and thus producing severe concussions or vibrations in surrounding earth and air. In this jurisdiction, the rule has been adopted that, if one, in blasting upon his own lands or upon the lands of another with the owner's consent, invades the premises of his neighbor by throwing stones and debris thereon, he is liable for the resulting injury, but, for any injury resulting from the mere concussion of the atmosphere, sound or otherwise, there is no liability, unless it is shown that the work was done negligently and that the injury was the result of negligence and not the result of blasting according to the usual methods and with reasonable care. . . .

"The evidence of the 'subcontractor' tended to show that the mode of blasting adopted was the only practicable one, and that the work was prosecuted with due care and without negligence. On the other hand, there was some evidence from which it might be inferred that excessive and unnecessary quantities of dynamite were used and that the damage to appellant's dwelling resulted from the negligent manner in which the work was conducted."

—Arthur L. H. Street,
Attorney-at-Law.

Old Times and Old Timers

Early Shovels

THIS LETTER from Old Timer Fred Nichols of Los Angeles is full of interesting anecdotes of the "good old days."

"In the early days of shoveling, from 1900 on, the leading shovels were: the good old Bucyrus; the Marion; the Vulcan, sometimes called the 'Little Giant'; the Thew Automatic; and the Boston rig.

"Speaking of Boston shovels, they really were Old Timers. I never was on one, but have seen them at a distance. I understand that the boiler was in two sections, and it was quite a trick to make one percolate. The two I saw were laid up at a small town just out of Indiana, Pa. I was on an old Vulcan shovel for the T. A. Shoemaker Co., of Belfonte, Pa. The job was moving a slide of pure mud which had filled in a cut on the B. R. & P. R. R. Pete Sailor was the Super; our family affair as usual on the shovel; George Harpster was the blacksmith, and a real one he was. Frank Bell was one of the dinkey-skinners. The shovel was a very old type of Vulcan. The dipper was about a two-yard, but it was the funniest dipper—larger at the top and tapered smaller toward the lid. Boy, you could get a dipperful of that mud and the more you shook it the farther down and the tighter it would get. Some rig! A half dipperful was the trick!

"The first Thew Automatic I ever saw was in operation at the Jones & Laughlin Steel Mills at Pittsburgh, digging ore about 1902 or 1903. We met Jim Keeley in a Bar Cafe. My Father greeted him, saying, 'What are you doing now, Jimmie?' Jim said, 'Oh, I'm running one of those Zulus over in the steel mill.' Of course, I wanted to know what a 'Zulu' was and was told it was a machine which had no craneman. The shovel runner had to both run and crane. Quite a number of men refused to run them on that account.

"At that time we were working on a Marion G and a 90-ton Vulcan shovel for Tom MacNally, contractor, whose shop was at 2nd & Bates St., Pittsburgh. He was building a 8-yard dipper, which was some dipper in those days. I presume the large bucket was for this 90-ton Vulcan."

Thanks, Old Timer Nichols, for your interesting letter about some of the early shovels.

An Incident on the C. & O.

OLD TIMER C. A. Sears of St. Albans, West Virginia sends us this photograph of a Bucyrus 70-C shovel and says:

"Am enclosing a picture of a 70-C on her side. This shovel at the time (1926) belonged to Reed & Lapsley of South Charleston, West Virginia. It was casting over the main line on the Guyan Valley Division of the Chesapeake & Ohio at Big Creek, West Virginia. The operator picked up a big rock on the opposite side from the main tracks, and eased it around over the main line when all of a sudden the machine turned completely over even though the jack arm was sitting level on solid rock. The weight of the rock was too much when the dipper sticks were pushed out.

"The craneman opened his throttle to reverse—and jumped—and the sticks ran all the way in as shown in the picture. The shovel, lying across the main line track, blocked traffic for several hours until a wrecker could be brought out from Logan, West Virginia. The wrecker soon had her back on the rails and all the damage done was found to be only a slightly bent hog rod. She was ready to work as soon as she hit the rails right side up."

Thank you, Old Timer Sears.

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ARNOLD ANDREWS
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E. M. HEUSTON
Advertising Manager

E. T. OBENCHAIN
Assistant Editor

Ten Billion More

AT THE END of the present Federal Administration the Federal debt will exceed thirty-five billion dollars. To put it in another way, the unpaid Government obligations which will fall upon the taxpayer as a collective debt of his, will exceed thirty-five billion dollars. Our debt at the end of the World War was approximately twenty-five billion dollars. This means that the American public, collectively, are in debt ten billion dollars more than they were at the close of the World War in 1918.

It is rather difficult to form any idea of this amount of money. One means of comparison is brought to us by consideration of the fact that a little over one billion minutes in time have passed since the birth of Christ and that in a life time of seventy years, a little less than thirty-seven million minutes pass.

Thirty-five billion dollars means two hundred and eighty dollars for each man, woman, and child in the United States on the basis of a population of 125,000,000 people. If we assume that there are fifty million persons engaged in gainful occupations, the present debt is $700 for each of them.

If we are to assume that a normal Government debt should be about one and one-quarter billion dollars, as it was before the World War, we arrive at the conclusion that the present debt is above what it should be by $675 for every individual in the United States gainfully employed.

This Government debt can only be disposed of in one of three ways—or by a combination of the three methods.

By the taxation method the debt is paid collectively by all of those who buy and sell any commodity or service within the limits of our political boundaries.

By the debt reduction method of repudiation, a method which the United States Government has never resorted to, the debt is paid, in the main, by exactly the same individual.

By the method of inflation, again the burden of payment falls on exactly the same shoulders.

If we assume that the United States Federal debt will be paid by a combination of taxation and inflation, as it inevitably will be, we cannot escape the consideration that inflation and heavy taxation have always been enemies of prosperity and increasing business activity.

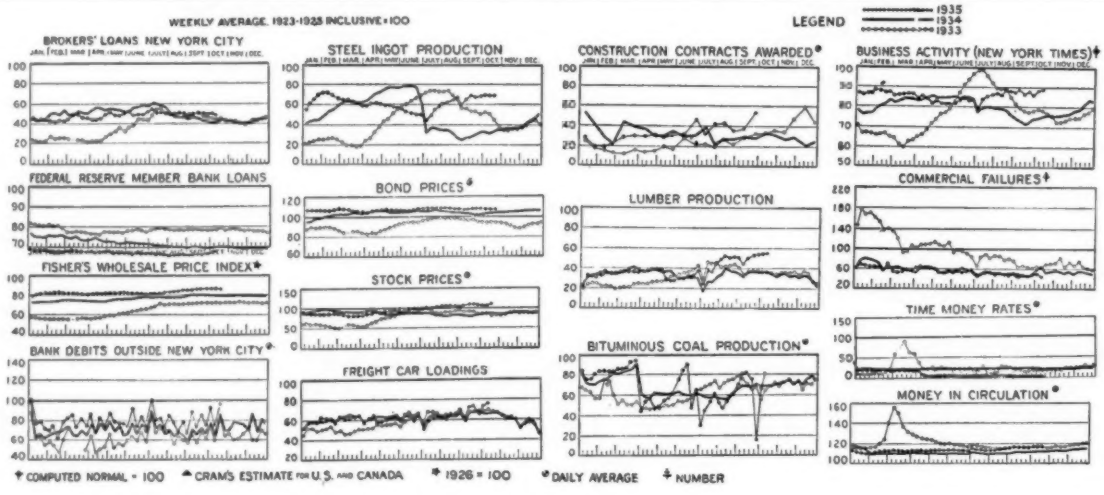
During the past three years we have used billions of dollars "to prime the pump," and in the operation formed an ever growing cloud over the nation's business—the very factor upon which prosperity depends and which is greatly influenced by the optimism or pessimism of the individuals engaged in business.

Whether the irregular increase in business activity that we have experienced in the last three and a quarter years has been because of pump priming or in spite of excessive pump priming, it is high time that every individual engaged in business of any kind vigorously protested against fabulous Governmental expenditures, a continuation of which will prove to be a handicap far outweighing the questionable benefits of the present. The burden and handicap of heavy taxation and inflation will fall on the shoulders of us all, including even those to whom it appears that the present expenditures are directly benefiting their own businesses.

Money at Last, but Winter Stops Jobs

IT IS RATHER SAD that not until now, as winter is setting in, has the Government been able to unsnarl the countless miles of

WEEKLY BUSINESS INDICATORS



red tape which has been wrapped around Federal public works construction. In most states, this means postponing actual work on such projects as are of any real value to the public until spring. Not so much that winter work is impossible in these states, but because so many restrictions and complications already hamper the contractor on work financed by Federal funds that he can hardly undertake the added burden of combating freezing weather.

At liberty to use the best, most efficient and productive methods for his work, many men could undoubtedly be placed on contractors' payrolls through the winter. Also the direct employment on the job would be multiplied by employment in the factories where equipment and supplies are built. But with most contracts carrying restrictions as to average dollars per man directly employed, the contractors are faced with doing much of the work with pick and shovel methods of Civil War days, and that means winter shut down with the coming of the first frost.

Strange though it may seem, we've heard of several large and enterprising contractors who are figuring their bids on the basis of the most economical of modern equipment with the idea of employing the required number of laborers and letting them sit on the bank to watch the dirt go by. Sounds goofy, but they find the estimated cost per yard is lower on this basis.

EXTRA

THE BUREAU of Reclamation will receive bids at the Yuma, Arizona, office for certain construction work in connection with the All-American Canal project as follows:

November 21—Construction of the Imperial Dam and desilting works on the Colorado River, 18 miles upstream from Yuma; involving 2,458,000 yards of all classes of excavation, and 165,000 yards of concrete.

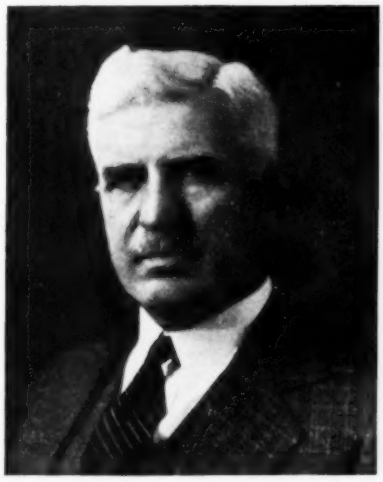
November 23—Construction of All-American Canal from station 50 to station 245; 1,194,000 yards of common excavation, and 542,000 yards of rock excavation.

November 25—Construction of four wash siphon structures; involving 370,000 yards of excavation, and 32,380 yards of concrete.

Copies of bidding forms and specifications may be obtained from the Bureau of Reclamation offices at Yuma, Denver, and Washington.

John Francis Cushing

JOHN FRANCIS CUSHING, President of the Great Lakes Dredge & Dock Company, Chicago, was killed October 7 when an airplane, on which he was a passenger, crashed in Wyoming.



Mr. Cushing was born in Arapahoe, Nebraska in 1882. In 1906, he graduated from Notre Dame University in civil engineering.

Starting as a timekeeper for the Great Lakes Dredge & Dock Company, Mr. Cushing successively served as field engineer, division engineer, and in 1919, became assistant general manager. His election to the presidency of the company took place in 1922, and he was named the chairman of the board in 1929, holding both positions at the time of his death.

Many large projects were constructed by the Great Lakes Dredge & Dock Company while Mr. Cushing was president. Some of the better known were: straightening of the South Branch of the Chicago River; the Ogden Avenue viaduct; Lincoln Park lake front fill, and the fill for the World's Fair, all of which were in Chicago. In addition the Company carried on many large dredging projects both on the Great Lakes and along the Atlantic seaboard.

Mr. Cushing, or John as he was known to his associates and friends, was a real engineering executive who knew every phase of the work of his Company and knew well what part each man was to play. To the man who did his work properly he was a "good fellow" as well as a respected and highly esteemed executive. His watchword was "Progress" and he was a firm believer in the theory that economical, profitable work was a natural outcome of the proper use of good organization men and good equipment. As a consequence he leaves the future of his Company in the hands of a very capable corps of men each qualified for his particular duty. He also leaves with his Company the best and most modern equipment obtainable which was purchased during his regime after a most careful personal study of all essential details.

Thoughts for Executives

By Ernest W. Fair.

THERE is no expedient to which a man will not go to avoid the real labor of thinking," Thomas A. Edison once stated. He had that thought posted on signs about his laboratories.

Thinking and planning go hand in hand to make the difference between the successful man and the failure. But there are many kinds of thinking. Harvey Firestone, founder and president of the great rubber firm bearing his name, explains it:

"Many values are intangible and cannot be put down on paper in terms of dollars and cents . . . but this is the point . . . if you can make a picture of a situation in your own mind, then you can make comparisons and relate values, even if you cannot express them. Some people call this vision, and we hear a great deal about the necessity of vision. But vision, as I see it, is not a dreaming forward. It is thinking through with the values ever in mind. Quick decisions that have not behind them a long train of thought are exceedingly dangerous. Personally, I do not want to have around me the kind of a man who can give me an instant decision on anything I may bring up, for, if he has not had the opportunity to give the question serious thought, then he is only guessing. And I can do my own guessing!"

Yet Firestone made few guesses in his life; his decisions had back of them careful thought and planned procedure.

The man who takes time to plan his life and his work, and does so carefully, generally attains a topmost position in his profession.

EQUIPMENT
You Ought to Know About

Interchangeable Breaker and Sheeting Driver

A POWERFUL, easy-running breaker for heavy demolition work, known as the Worthington No. 10 Master Breaker, which is convertible also into a useful sheet piling driver, is one of the most recent developments of the Worthington Pump and Machinery Corporation, Harrison, New Jersey.

This double-duty tool is useful for the heaviest classes of concrete breaking, crushed rock tamping, ripping up pavements, loosening hardpan, removing slag in blast furnace work, and, in its converted form, for driving sheet piling.

Either the breaker or the sheeting driver may be purchased as a separate unit. The net weight of the breaker is 82 lbs., the sheeting driver, 120¼ lbs. Bulletin W-1200-B12, completely describing these units, is obtainable on request.

Heavy Duty Welding Cable

A NEW type of welding cable designed to meet conditions of extremely severe wear and abrasion is announced by The Lincoln Electric Company, Cleveland, Ohio. "Realwear" cable consists of fine, tinned copper wire laid in ropes and stranded. Individual ropes are alternated in succession as regards the direction of the lay to prevent distortion in applications of severe usage.

The conductor is insulated with an especially developed rubber compound to provide firm adhesion between the cover and rubber insulation.

High grade cotton woven on a loom and securely joined to the rubber belt by a special process forms the cover. The cover is provided with a finish very resistant to oil, grease, acid, gasoline, moisture and heat. The strength of the new cable is comparable to that of fire hose.

"Realwear" cable is supplied in the following sizes: 2, 1, 0, 00, 000, and 0000.

Caterpillar Welder Unit

A COMPACT electric welding unit designed by Caterpillar Tractor Co. of Peoria, Illinois, has been announced as a standard addition to the company's line of products. This unit consists of a General Electric generator and a Caterpillar Twenty-Eight Tractor.

Because of its flexibility, short turning and track-type construction, this outfit is able to get into otherwise inaccessible spots along railroad right-of-ways. It can be driven over rails, steep shoulders, and can rest alongside the track, clear of traffic while welding is progressing. Its drawbar is also free for pulling jobs often found unexpectedly along a section during track repair.

From the tractor engine flywheel back, the platform has been redesigned to include an enclosed generator and equipment, with maximum efficiency of the welder unit in mind. The design attains compactness through arrangement of generator and its accessories. The top of the welder section is only a few inches higher than the tractor hood. Controls and seat have been moved to the right, permitting comfortable and convenient tractor operation.

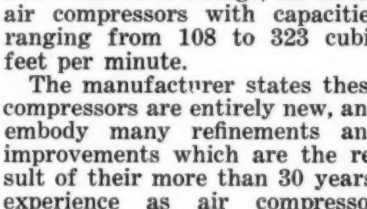
The generator is 300 amperes, 40-volt and of the D.C. type. It is operated by power take-off at the rear of the tractor through a V-belt drive. The control panel is handily located on the right rear side of the tractor. Compartments are built at the rear of the unit for reeling and storing welding cable and to keep an ample supply of welding rods. A hinged steel cover and compartment doors fitted with hasps and locks, protect the entire assembly and tractor operating space from pilferage and weather.

Two-Stage, Air-Cooled Air Compressors

CHICAGO Pneumatic Tool Company, 6 E. 44th Street, New York City, has announced a new line of two-stage, air-cooled air compressors with capacities ranging from 108 to 323 cubic feet per minute.

The manufacturer states these compressors are entirely new, and embody many refinements and improvements which are the result of their more than 30 years' experience as air compressor builders. To the users of compressed air, these new compressors offer high efficiency, reliability, low maintenance cost, simplicity, and smooth, quiet operation.

The four sizes of compressors



available with either built-in motor drive; coupled motor drive; V-belt drive; or flat belt drive. Bulletin No. 759 illustrates and describes in detail this new line of compressors and is available to anyone interested.

Combination Snake-Bite and First-Aid Kit

MEN WHO WORK in areas infested with poisonous snakes are always in danger. No matter how experienced they may be in safeguarding themselves, there is always the chance of an unexpected encounter with a rattler, copperhead, or moccasin. When this happens, the victim must be given protective treatment immediately or his life may not be saved.

A little kit, packed in a metal box small enough to go into a pocket and containing all the equipment needed to treat snake bite in the field, even by the victim himself in most cases, is sup-

plied by the Davis Emergency Equipment Company, New York. In a combination outfit, recently developed by this company, a snake-bite kit and a standard first-aid kit are supplied together in a compact two-pocket khaki pouch, which can be carried on a belt.

The snake-bite kit contains a tourniquet for stopping circulation above the wound, a two-edged lancet to open up the minute fang holes and provide an outlet for the poison, an unbreakable Bakelite syringe for pumping blood out of the enlarged wound, thereby flushing out the poison, and also antiseptics, bandages, and ammonia inhalant for use in case the victim becomes faint.

Experience has shown that the use of an unbreakable material for the syringe, a feature of the Davis Snake-Bite Kit, is of special importance. Fragile syringes are apt to be broken under field conditions, and a broken syringe may mean the loss of a life.

Six-Yard Ford Truck

ALTHOUGH this new Ford V-8 truck, equipped with special Galion body and hoist and Timken third axle, is at work on Fort Peck Dam, it is said to be by no means a "Fort Peck Special," but can be used advantageously any place where moving lots of earth in a hurry under tough conditions is the major consideration. As practically all the excavating on this world's largest dirt dam is shovel work, these bodies for the Ford V-8 trucks were equipped with cab protectors, which, while the vehicle is being loaded, protect from falling dirt, not only the cab, but the driver as well.

The heavy-duty body, weighing only 2,700 pounds, is fabricated of 10-gage plate steel. The dimensions are 120 inches by 76 inches, with straight sides 25 inches high, which, at the top, flare for eight inches at a 45-degree angle, giving a capacity of six cubic yards.

The understructure consists of four-inch channel cross members placed on 12-inch centers, five-inch I-beams being used for longitudinal members.

On the inside, the body is reinforced with eight-gage cleats set at 45 degrees, so rigidly reinforcing the body that it was possible to use 10-gage plate, the maker claims, thus saving weight.

The side braces extend from

the running boards to the flare, so substantially reinforcing the flare as to allow considerable heap to the load. The hoist, weighing 930 pounds, is of the double-arm hydraulic type, featuring the patented equalizing-lift mechanism, which develops maximum capacities with extremely low oil pressures, according to the manufacturer.

Hobart Arc Welder

HOBART BROTHERS, Troy, Ohio, have recently announced the addition of a 75-ampere electric arc welder to their line of welding machines. This new welder has a welding range from 15 to 125 amperes. It is especially suited for use on light gauge metal, and for installation of heating and piping systems. The welder is mounted on a steel truck with four disc wheels and drawbar so that it may be moved about easily. If desired the welder can be detached from the truck and installed permanently.

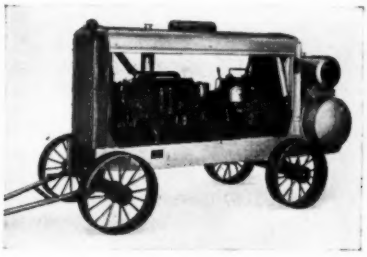
Other features built into this welder by the manufacturer are: Remote control—gives the operator finger-tip control of welding current for fine adjustment right at the work, no matter how far away from the welding machine he may be working; polarity switch — a switch on the control panel changes the polarity instantly, eliminating the necessity of changing cable when changing from one type of welding rod to another; two-way meters — separate voltmeter and ammeter enable operator to check voltage and current independently; fine adjustment — triple range selector with volt-amp adjuster makes available dual control; four-pole exciter — an oversized 4-brush exciter gives all the advantages of separate excitation, insuring prompt building up and exceptionally quick recovery of the arc.

Complete information regarding the equipment mentioned on this page may be had by writing the manufacturers. We will appreciate your mentioning EXCAVATING ENGINEER.

Two-Stage Portable Air Compressors

FOUR MODELS of Aero-2-Stage portable compressors for delivering 105, 160, 210, and 315 cubic feet of actual air per minute (A.S.M.E. standard test), for use wherever a mobile compressed air plant is needed by builders, contractors, railoads, mines and others, are now offered by the Worthington Pump and Machinery Corporation, Harrison, N. J.

Advanced design features throughout insure highest efficiency and endurance, the manufacturer states, with delivery of the greatest volume of air at lowest fuel and maintenance cost. The four models are compact and complete compressed air plant units. They are balanced-angle, two-stage, air -cooled, unit-assembly, with clutch connection to



heavy-duty 6-cylinder Hercules gasoline engines, speed, 830 r.p.m. and air pressure, 100 lb. gauge. The compressors are equipped with improved Feather Valves, ring-type cooling fins, articulated connecting rods, drop-forged crankshaft, Timken roller bearings, spray and force-feed lubrication, oil filter, and V-belt-driven cooling fan. Mounting of the unit depends upon requirements and size. Thus the 105 model may be had as follows: skid-mounted; steel wheel, solid rubber or pneumatic tired towabout; four-wheel solid rubber or pneumatic tired spring trailer; two-wheel single-axle spring trailer with solid rubber or pneumatic tires; truck-mounted; power take-off drive; rail car; mine car.

For complete details write for literature and give the cubic feet of air to be compressed per minute. Four bulletins are available: one for each compressor size.

SHOTS *from the Firing Line*

Awards Made on Florida Cross State Canal

EIGHT CONTRACTORS have been awarded contracts, involving a total of 13,535,000 yards, as a result of their bids submitted to the U. S. Engineers at Ocala, Florida, October 7. The contractors and their sections are:

Blythe Bros., Barnswell, South Carolina, Item 4 (Alt.), 332,000 yards at 23.44 cents, and Item 14 (Alt.), 550,000 yards at 22.39 cents;

Badgett Construction Company, Memphis, Tennessee, Item 6 and 7, 1,193,000 yards at 23 cents;

George S. Funk, Clarksdale, Mississippi, and **Stevenson Company**, Helena, Arkansas, Item 8, 9, 10 (Alt.) 818,000 yards at 24 cents;

Hooper Construction Company, Bunnel, Florida, Item 13 (Alt.), 538,000 yards at 23 cents;

Harvey, Ray & Noonan, Pensacola, Florida, Item 17, 18, and 19, 1,933,000 yards at 21 cents;

Benjamin Foster Company, Philadelphia, Pa., Items 21 to 26 inclusive, 4,741,000 yards at 21.6 cents;

Geo. D. Auchter Company, Jacksonville, Florida, Item 27, 380,000 yards at 24.8 cents per yard; Item 28, 542,000 yards at 21.9 cents, and Item 31, 350,000 yards at 21.6 cents.

Lewis-Chambers Construction Company, New Orleans, Louisiana, Items 15 and 16, 1,117,000 yards at 20 cents, and Items 29 and 30, 856,000 yards at 19 cents.

Aggregate Associations to Hold Convention at St. Louis

THE ANNUAL conventions of the National Sand and Gravel Association, the National Crushed Stone Association, and the National Slag Association will be held jointly in St. Louis at the Hotel Jefferson during the week of January 27. An important feature of the convention will be a machinery exhibit sponsored by the associations. A joint banquet will be held on the evening of Wednesday, January 29, at which a speaker of national prominence will address the groups on the efforts of industry to achieve stabilization under existing law. The closing sessions will be devoted to transaction of business and the election of officers for the following year. Further details of convention plans will be published later.

Committee Formed to Develop a National Building Code

A DEFINITE step towards the writing of a National Building Code was taken recently with the formation of the American Standards Association Building Code Correlating Committee with Rudolph P. Miller, Chairman, and George N. Thompson, Vice-Chairman. The Correlating Committee will supervise the work of several sectional committees which will be assigned to develop building standards and specifications. These will be made available to municipalities in developing their own building codes, and in this way the collected experience of national organizations can be passed on to the local bodies.

There are today more than 1600 building codes in the United States, many of which vary widely as to construction requirements. It is expected that the work of this committee will serve to make building requirements more uniform. Mr. Miller, former Building Code Commissioner of Manhattan, New York, was the author of the National Board of Fire Underwriters' Building Code, a code for New York City, Rochester, and Niagara Falls, and has been consultant for building codes in other cities. He represents the American Society of Civil Engineers and the American Society for Testing Materials.

Road Show Space Reservations Establish Record

THE RENEWAL of the Road Show feature of the Annual Convention of the American Road Builders' Association, the first since 1933, has aroused nation-wide interest, judging from the applications for space which have poured into the Association headquarters. The convention meetings and road show will be held in Cleveland's new exhibition hall January 20 to 24, 1936.

The Road Show is accepted by the highway industry and profession as a barometer of highway-street construction, and the fact that the 1936 Road Show is a sell-out three months in advance of opening is described by A. R. B. A. officials as conclusive evidence that the industry is over the top on the road to prosperity.

Acetylene Association Meets in Cleveland

THE 36th ANNUAL Convention of the International Acetylene Association will be held in Cleveland November 12 to 15 at Hotel Cleveland. The keynote speaker of the Convention will be Merle Thorpe, Editor of Nation's Business. Topics of current interest will be discussed by well-known executives and engineers. Special features of this year's convention include a welding and cutting forum and the presentation of the industrial play "Profits of Progress."

Foreign Notes

Malaya

From Singapore comes this snapshot showing a Ruston-Bucyrus Diesel-powered clamshell machine excavating for a ramp as a part of the program **improving the commercial flying field** located there. The crane, mounted on a flat deck steel scow finds easy going in the silt deposit. The spoil is loaded to barges and hauled away for disposal.

England

New houses and homes are springing up all over England, not like mushrooms overnight, but sufficiently fast enough to be very noticeable. Last year, 1934, easily beat all building records, and 1935 will just as easily beat 1934. A lot of the building is in con-

True Economy Depends on Value — Not on a Price Tag

CONTRACTORS and engineers everywhere have learned by actual experience that true economy depends on value — not on a price tag. This is especially true when buying wire rope. You cannot afford to make a blind choice, because frequent and unexpected wire rope failures not only slow down production, but they also increase operating expense.

A wise choice for a dependable wire rope is "Hercules" (Red Strand). Made of acid open hearth steel wire, rigidly tested for strength, toughness, flexibility and wearing qualities.

In order to be suitable for all conditions, "Hercules" (Red Strand) Wire Rope is made in a wide range of constructions, including Round Strand, Flattened Strand, Preformed, Non-Rotating, and Steel Clad types. If you will tell us how you use wire rope, we shall be glad to suggest the construction we consider best for your work.

Made Only by **A. LESCHEN & SONS ROPE CO.** Established 1857

5909 Kennerly Avenue, St. Louis, Mo.

New York - - - - - - 90 West Street
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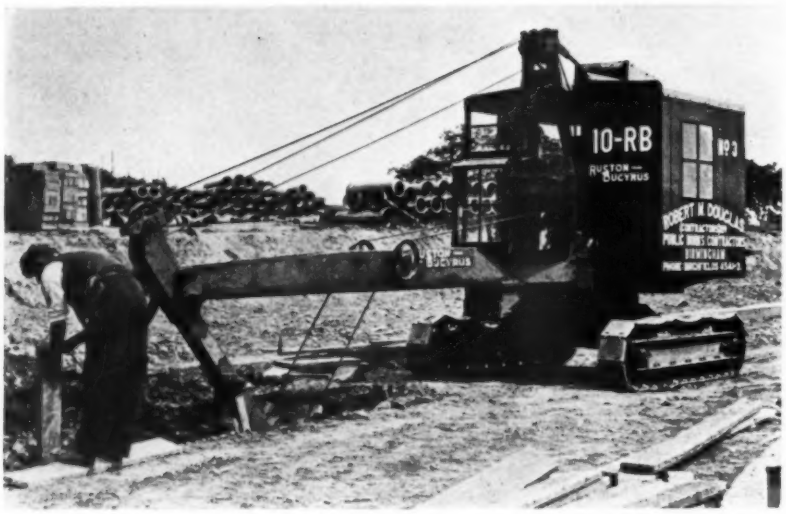
San Francisco - - - - 520 Fourth Street

For your convenience in writing to A. Leschen & Sons Rope Co., you will find a card bound in this issue.



nection with the many slum clearance schemes throughout the country, but in addition quite a bit is being done by a great number of large and small contractors who have been buying up large estates or other vacant property around the large cities, particularly London and Manchester. Much has to be done after the land is purchased and before house building commences. In many instances the ground has to be levelled, but in all cases new roads have to be constructed, and extensive sewerage and water lines laid. Illustrated above is one of the building projects being carried on by **R. M. Douglas** of Birmingham. After the streets have been put through he uses his Ruston-Bucyrus 10-RB to excavate the sewer. In the illustration the machine is digging a trench 8 feet deep, 2 feet 6 inches wide in gravel.

The illustration below shows work being done by **Drage & Kent** in connection with levelling a site for a recreation ground as a part of a big housing estate. This contractor operates a Ruston-Bucyrus 10-RB skimmer scoop which loads to the horse-drawn two-wheel wagons.

New England Notes

By M. E. POAG

Merritt, Chapman & Scott, New York City, were recently awarded another section of the Cape Cod Canal project, involving 1,050,000 yards of excavation for $365,690.

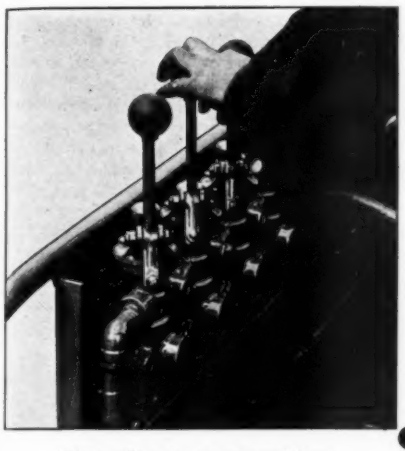
B. Perini & Sons, Framingham, Massachusetts, were awarded a contract involving 2,290,000 yards of excavation for $787,046 on the same project.

New York Notes

By G. E. PETERSON

Low bidders at recent State Highway lettings were: **Bero Engineering Company, Inc.**, North Tonawanda, $90,831 for 2.58 miles 20-foot concrete in Tompkins County; **A. E. Ottaviano**, Croton, $152,697 for 2.3 miles of 20-foot concrete in Putnam County, and $354,443 for 7.34 miles concrete in Putnam and Dutchess Counties; **Tomack Subsidiary Company**, Rochester, $286,632 for 7.15 miles of concrete and macadam in Ontario County; **M. F. Dollard**, Albany, $511,978 for 7.88 miles of concrete in Albany and Green Counties—164,300 yards of excavation; **W. L. Collins**, Hornell, $79,047 for bridge and approaches in Steuben County; **Naclerio Construction Company**, Bronx, $328,925 for grade separation on the Henry Hudson Parkway—200,000 yards of excavation; **M. K. Engineering Company, Inc.**, Albany, $262,962 for 6.79 miles 20-foot concrete in Jefferson County; **Mayersohn Engineering Company**, Albany, $388,883 for 11.59 miles concrete in St. Lawrence County; **Garafano Construction Company**, Mt. Vernon, $166,503 for 1.71 miles concrete in Kings and Queens Counties; **Sweeney & Boland**, Rochester, $116,086 for 1.49 miles of 20-foot macadam in Essex County; **Dale Engineering Company**, Utica, $348,754 for 6.32 miles 30-foot macadam in Oneida County; **A. W. Banko**, Kew Gardens, $316,781 for 4.19 miles of concrete in Nassau County; **Good Roads Engineering and Contracting Company, Inc.**, Wantagh, $187,230 for grade separation at Farmingdale in Nassau County; **Guy B. Dickinson**, Syracuse, $41,383 for 1.19 miles 30-foot macadam in Onondaga County; **John Arborio Inc.**, Poughkeepsie, $215,877 for 4.06 miles of concrete in Warren County; **Madison County Construction Company**, Solsville, $301,572 for 6.66 miles of 20-foot concrete in Madison County; **J. J. Bellotte & Sons**, Troy, $50,176 for bridge and approaches in Otsego County.

Low bidders in the Metropolitan Area have been: **George H. Flinn Corporation**, New York, $5,394,287 for section No. 10 of the 6th Avenue subway. This section runs from 40th to 47th Street; **Rosoff Tunnel Corporation**, New York, $1,461,410 for intercepting sewers in New York; **Thomas J. Waters & Sons, Incorporated**, New York, $1,976,400 for buildings on Brooklyn College Project; **Wilaka Construction Company**, New York, $2,263,900 for high school in Brooklyn; **Rusciano & Sons**, Bronx, $347,946 for tunnel work on Geo. Washington Bridge approach in Manhattan; **J. J. Bellotte**, Troy, $123,160 for grading at the Brentwood Hospital; **Corbetta Construction Company**, New York, $1,494,644 for the Manhattan approach link of the Tri-Boro bridge; **J. H. Carle**, Baldwin, $51,696 for paving in Hempstead; **John Mucci**, Yonkers, $36,274 for sewer in Yonkers; **Rocco Grella**, Glen Cove, $48,000 for paving at Hicksville; **Meads Engineering Company**, New York, $49,600 for Greenpoint Avenue bridge improvement; **George T. Kelly**, Yonkers, $268,000 for sewage treatment plant at Woodbridge, N. Y.; **Faircroft Engineering Company**, Brooklyn, $552,512 for grade separations on Staten Island; **F. H. McGraw**, New York, $510,000 for sewage disposal plant at Hartford, Conn.; **Garafano Construction Company**, Mt. Vernon, $77,010 for trunk sewer in Yonkers; **E. T. Barry**, Laurelton, $99,340 for paving in New York; **Poirier & McLane**, New York, $2,144,830 for Randalls Island Junction of the Tri-Boro Bridge; also $41,000 for highway bridge at Great Neck; **Lane Engineering Corporation**, New York, $50,773 for pumping stations at Staten Island.



This is all it takes to raise and lower, or side shift the blade, steer, lean the wheels, reverse the circle, or shift the frame on the rear axle. Almost effortless but always accurate.

INSTANT RESPONSE
FOR SUPERIOR GRADING
PERFORMANCE!

● Only on Austin-Westerns can you get the instant response to a shift in the controls so necessary for accurate blade grading.

No matter how long or how heavy the work, the action of hydraulic controls is direct and immediate. No lag due to wear is possible since gears and universals have all been replaced by a single rotating part—the pump.

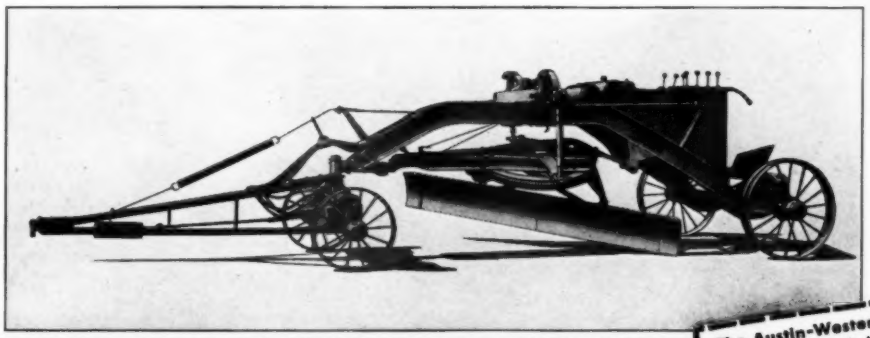
AND THE *toughest backbone* ON THE ROAD

Years of experience have shown that the Austin-Western welded one-piece box girder frame provides absolute rigidity to resist every thrust of the hardest operating conditions. Only this kind of construction supplies endurance for consistent year-in and year-out performance.

Other features: direct draft between tractor hitch and blade, excellent blade visibility from the operator's platform, one-piece oversize circle, five-point draft beam support—make the most effective blade grader on the market today.

The entire effort of Austin-Western is directed to the development and construction of road building and earth moving machinery. That is why Austin-Western makes the most complete line, and why standard for Austin-Western is standard for the industry.

Write for complete information on this or any other machine listed below, or use the coupon.



Welded girder type frame resists strain or twist. Permits greater high lift angle, more accurate adjustments, and a better view of the blade.

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Please tell me more about your hydraulic blade graders.
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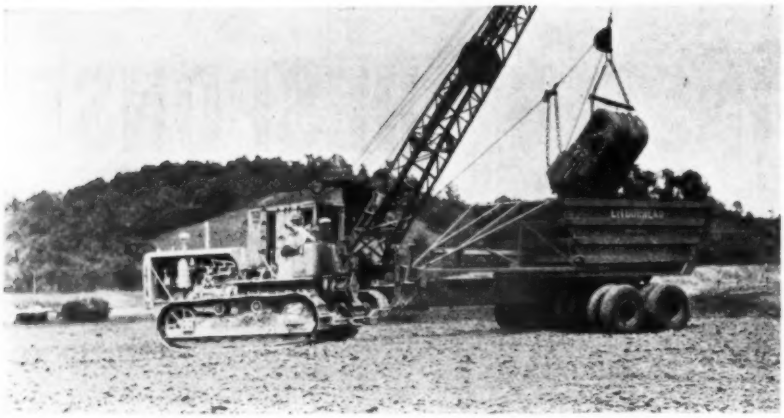
When writing to The Austin-Western Road Machinery Co., please use coupon or card bound in this issue.



Ohio Notes

Diesel-powered equipment is being used to good advantage in the construction of the earth-fill Piedmont Dam, a unit of the Muskingum Valley Conservancy District, which is being constructed by **Hamer Brothers, Inc.**, Greenville, Ohio, at a contract price of $442,000. The work involves 135,000 yards of excavation; 18,000 yards of stripping; and 615,000 yards of borrow. The illustration above shows a Bucyrus-Erie Diesel-powered dragline with a 2½-yard bucket loading to a 30-yard LeTourneau buggy drawn by a Caterpillar Diesel. It takes an average of 13 buckets heaped full to fill each buggy. Under average digging conditions it requires 8 minutes to load a buggy.

By HENRY F. UNGER

Cleveland Trinidad Paving Company, Cleveland, submitted low bid of $149,945 for three miles of concrete paving on the South Miles road in Solon, North Randall, and Bedford Townships, Cuyahoga County. This company was also low bidder on the widening project on Mayfield road between Coventry and Kenilworth roads in Cleveland Heights.

Cuyahoga County has been allotted $580,000 for **three grade crossing elimination projects**, one located in Cleveland, and two in the county. It is expected that work will start soon.

Michigan Notes

By C. F. BARTON

The Midland County Road Commission recently built a new bridge over Little Salt Creek. The illustration to the right shows one of their two Bucyrus-Erie 21-B machines, working as a dragline, casting in the approach. The Highway Department maintains all of its road building equipment in the best possible operating condition, and as a result the machines turn out good yardages year after year.

Illinois Notes

By H. H. BUCHANAN

Buell Black, operator for **Krueger Construction Company**, Park Ridge, writes from Polo that their Bucyrus-Erie D-2 Diesel shovel is still loading from 100 to 150 yards of dirt per hour. Operator Black has been operating Atlas Diesel draglines for over twelve years, the last six with the Krueger Construction Company. More power and yardage to you!

St. Louis and Vicinity

By A. J. KOENIG

Union Construction Company, Winona, Wisconsin, was low September 17 with a bid of $2,120,906 for the construction of Lock and Dam No. 25, Mississippi River, near Winfield, Missouri.

CHARLES S. SAMPLE

Charles S. Sample, construction engineer for the Missouri Pacific Railroad, died September 25. Mr. Sample, who had a record of 33 years continuous service with the Missouri Pacific, was born in Philo, Illinois. Following his graduation from Purdue University in 1899, he worked three years for the Chicago & North Western, and in 1902 joined the Missouri Pacific as assistant engineer. He was made construction engineer in 1921.

The War Department has approved plans for a **bridge across the Mississippi River** between St. Louis and East St. Louis. The bridge is to be built by the St. Clair County (Illinois) Board of Supervisors, East St. Louis, Illinois.

Five grade-elimination projects in St. Louis are included in a list of **33 proposed highway and railroad grade crossing eliminations** in Missouri. The list has been forwarded to Washington for final approval after being passed on favorably by the state director of the WPA, the state director of the National Emergency Council, and the District Engineer of the U. S. Public Roads.

River Notes

St. Paul District

Bids will be received November 8 for the **construction of Onalaska Dam** in the Black River at Onalaska, Wisconsin, near La Crosse. Principal items of work are: 11,500 yards of common excavation; 7,000 yards of top soil excavation; 101,400 yards of dike embankment; 4,000 yards of rip rap; 7,800 yards of concrete.

Memphis District

S. E. Evans, Fort Smith, Arkansas, was low with a bid of 19.9 cents, September 16, for the construction of approximately 271,000 yards of earth work in the Crawford County Levee District near Van Buren, Arkansas.

New Orleans District

Dameron & Kenyon, Port Allen, Louisiana, was low October 1 with a bid of 10 cents per yard for the construction of 1,700,000 yards of earth work on the Viva-Bayou Fordoche Levee.

Lower Coast Construction Corp., New Orleans, was low October 1 with a bid of 14.48 cents for the construction of 417,000 yards of earth work in the Barataria Levee and Lake Borgne Levee Districts.

H. B. Blanks, Ferriday, Louisiana, was low October 18 with a bid of 11 cents per yard for the construction of 250,000 yards of earth work in the Lucerna Levee, lower Tensas Levee District.

YOUR crane swings it over the rock pile, a floor man guides it to place. The crane lifts, away goes the rock, safely, surely . . . to be set down just where you want it. There is no "monkey-business" with this rock grab . . . it's simple, it holds fast till you want to let go . . . there is nothing to wear out or to get out of order. The savings its convenience makes possible run into big money. Five sizes . . . 2½ to 20-ton capacities . . . write for complete data on the Bucyrus-Erie Rock Grab.

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Shots From the Firing Line— *Continued*

Lower Coast Construction Corp., New Orleans, was low October 18 with a bid of 10.96 cents on 124,000 yards of earth work in the Little Rock Levee; 14.36 cents on 90,000 yards in the Oak Point Levee; 13.32 cents on 120,000 yards in the Gypsy Point Levee; and 23.83 cents on 20,000 yards in the Fanny Levee. The Government figures were low on: Saint Rosalie Levee, 35,000 yards at 24.08 cents, and Lower Buras Levee, 43,000 yards at 30.4 cents.

Boyce & Igo, Baton Rouge, were low October 18 with a bid of 15.87 cents on 87,000 yards, 16 cents on 70,000 yards, 29 cents on 85,000 yards, and 21.65 cents on 44,000 yards in the Red River and Atchafalaya Levee District.

McWilliams Dredging Company, New Orleans, was low October 18 with a bid of 25.3 cents for the construction of 2,000,000 yards of earth work in the Grand River-Bayou Sorrell Levee District.

South Dakota Notes

By LISLE REESE

The State Highway Commission recently awarded contracts for 20 road improvement projects totaling $275,180. Among the larger jobs let were: **Inland Construction Company**, Omaha, 13.7 miles of grading west of Belle Fourche for $49,860; **Jarvis, Wright and Howell**, Sioux Falls, 7.6 miles of grading on U. S. 14 between De Smet and Manchester for $26,695; **W. E. Bartholow and Son**, Huron, 18 miles of gravel base course on U. S. 212 west of Watertown for $32,113; **Hector Construction Company**, Hector, Minnesota, 12.1 miles of gravel base course on State Road 34 west of Madison for $23,766; **Summit Construction Company**, Summit, 20.3 miles of gravel base course on U. S. 14 and 16 east of Rapid City for $35,589.

Fort Peck Dam Notes

A new record in driving steel sheet piling was established early in October by **Frazier-Davis Construction Company**, contractors on the cut-off wall. The crews on the 200-foot driving gantry near the west end of the wall drove a pair of steel sheets to a depth of 163 feet into glacial till, one of the most difficult geological formations into which to drive piling. This contractor's previous record of 155 feet was made in the flood plain river valley alluvium.

Martin Wunderlich, excavating the lower end of the spillway, completed his contract on September 22, about three months ahead of schedule. He started work on November 7, 1934, and moved slightly over 2,540,000 yards of overburden topsoil and solid shale during the following eleven months.

Spillway Builders Inc. moved over a million yards of dirt for the fourth month this summer. The total excavation to their credit at the end of September was 8,041,125 yards measured quantity.

J. L. Shiely Company, St. Paul, Minnesota, was awarded a contract of 325,000 yards of coarse gravel, 193,000 yards of fine gravel, and 391,000 tons of sand for $555,140.

Another contract for 1,250,000 yards of gravel for the toes and upstream slope of the dam was awarded to the **Becker County Sand & Gravel Company** and **J. L. Shiely Company** jointly for $662,500. Both of these firms have been supplying similar material from the gravel pit at Cole, Montana, about 80 miles from the damsite by rail.

New Mexico Notes

The State Highway Department uses its Bucyrus-Erie 10-B shovel, shown in the illustration above, to clean up a slide on the road over the Taos Canyon Hill, 65 miles north of Santa Fe. The shovel casts the debris, consisting of black lava rock and dirt, into the canyon on the other side of the road.

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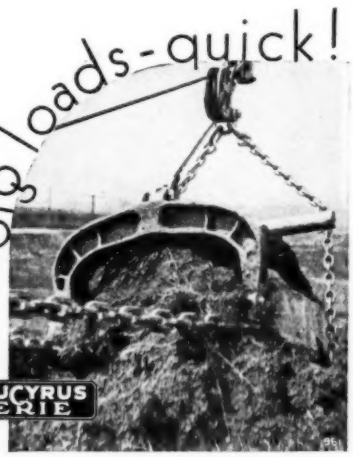

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Blasting NEWS

PUBLISHED BY

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TEST IS ACCURATE TO 1/1,000,000 SECOND

A machine that measures accurately to 1/1,000,000 of a second is described in the new Hercules booklet "Making Better Explosives." The instrument is called the Mettegang Recorder; it is used to check the velocity of Cordeau-Bickford detonating fuse, which in turn is used in checking the velocity of dynamite.

"Making Better Explosives" is designed to point out the great care exercised in the manufacture and testing of Hercules explosives and blasting supplies. It emphasizes that high quality and strict uniformity come from research, manufacturing skill, and thorough testing.

Some of the apparatus and tests mentioned in the text, besides the Mettegang Recorder, include: the Bichel gauge, ballistic mortar, hardness and plasticity gauges, underground gas chamber, testing pit, electric blasting cap test, and moisture control apparatus.

The booklet is attractively printed, with modern spiral binding, and is available to those who are interested primarily in explosives quality.

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1. Explosives exactly suited to your work.
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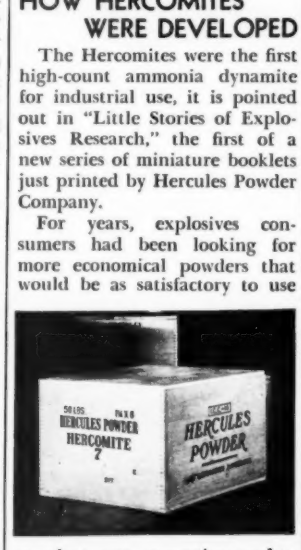
HOW HERCOMITES WERE DEVELOPED

The Hercomites were the first high-count ammonia dynamite for industrial use, it is pointed out in "Little Stories of Explosives Research," the first of a new series of miniature booklets just printed by Hercules Powder Company.

For years, explosives consumers had been looking for more economical powders that would be as satisfactory to use



as other more expensive grades. Hercules research solved the problem with Hercomites and thus made possible great savings to many explosives users.

The Hercomites, according to the booklet, represent but one of a number of important contributions made to blasting by Hercules. The story of some of these developments will be described in the remainder of the series of little booklets, to be issued subsequently.

Copies of "Little Stories of Explosives Research—the Hercomites" will be sent free on request.

DRIVING WORLD'S TUNNEL RECORD

Drilling an average of 26 holes to the round and using Hercules 40% gelatin dynamite, three crews, working 8 hours each, made what is believed to be a world's record in driving a 9-ft. tunnel when they advanced 65 ft. in 24 hours, according to information published in the June, 1935, issue of THE EXPLOSIVES ENGINEER.

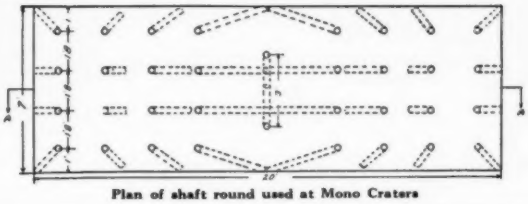
The world's record is one feature of the article entitled "Mono Craters Tunnel," descriptive of the methods used at the great water diversion project, at Mono Lake, north of Los Angeles, California.

Not only is the Mono Craters tunnel noted for this world's record, but the engineering procedure is intensely interesting to contractors. For example, the switching method and equipment speeded mucking operations 20%.

The $9,000,000 project commands much attention along the Pacific Coast because it represents a water diversion program 300 miles from Los Angeles. With the added supply of potable water, Los Angeles is preparing to meet the future challenge of population growth.

Details of the project are fully explained in the article. This is but one of several important articles on tunnel methods recently published in THE EXPLOSIVES ENGINEER. Other tunnel projects completely covered in THE EXPLOSIVES ENGINEER, especially in regard to drilling and blasting methods, include the Colorado Aqueduct series of tunnels (May, 1935), and the Twin Lakes tunnel, driven under Independence Pass, near Aspen, Colorado (December, 1934, and March, 1935).

Copies of these various issues will be sent on request.



Plan of shaft round used at Mono Craters

37 PERMISSIBLES REDUCED TO 10

How 37 permissible explosives marketed by Hercules in 1922 have been supplanted by a list of only 10 modern permissibles, which cover an even greater range more completely and effectively than the 37 replaced, is an interesting statement contained in the booklet "Hercules Permissibles."

The booklet is designed to help the industry in the selection of permissibles for the various mining conditions encountered. By discussing the characteristics of various Hercules permissibles, together with physical data on each explosive, it is possible for the user to understand the types of permissibles recommended for coarse coal, lump coal, rock work, and wet work.

By means of a relatively small permissible list Hercules not only makes selection less difficult, but, by concentrating on relatively few grades, is able to make better and more uniform products.

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Shots From the Firing Line—*Continued*

Arizona Notes

An allotment of $2,000,000 to the Bureau of Reclamation to begin construction of the first unit of the Gila Valley Reclamation Project in southwestern Arizona was announced recently. Completion of the First Unit of the Gila Project, which constitutes a comprehensive development in itself, will cost $20,500,000. This unit will embrace an area of 150,000 acres of desert in the Gila River Valley, with irrigation water diverted from the Colorado River at Imperial Dam, which will also head the All-American Canal by which water will be carried in the Imperial Valley, California. The allotment of $2,000,000 will enable the Bureau to construct the connection for the diversion from Imperial Dam and start the main canal, carrying it to the pumping station. Power from Boulder Dam and Parker Dam, allotted for use in Arizona, will be used in pumping water for this project.

Nevada Notes

The State Highway Department recently announced the following awards: **Fredrickson and Watson Construction Co., Fredrickson Bros. and Jones and King,** Oakland, California, grading and surfacing on Route 2 in Churchill and Lander Counties for $110,795; **Dodge Construction, Inc.,** Fallon, grading and surfacing on Route 5 in Nye County for $89,837; **Nevada Rock and Sand Company,** Reno, 18.6 miles of grading and surfacing in Humbolt County (includes 94,400 yards of roadway excavation and 34,465 yards of borrow pit excavation) for $103,598; and **Utah Construction Company,** Ogden, Utah, 3 miles of grading and surfacing in Storey and Washoe Counties (including 114,100 yards of roadway excavation) for $141,419.

California Notes

By H. L. LIVINGSTON

The following contracts have been awarded by the Division of Highways:

Southern California Road Company, Los Angeles, $43,404 for 1.5 miles grading and paving in Kings County;

American Dredging Company, San Francisco, $172,313 for 2 miles grading to be done by dredging in Alameda County;

Chas. Kuppinger, Lakeport, $16,943 for .12 mile grading in Sierra County;

Healy Tibbitts Construction Company, San Francisco, $15,000 for 0.4 mile of slide to be removed in Marin County.

The City of San Francisco is contemplating the **construction of a new sewage disposal plant** and it is expected that bids for equipment will be issued in about 60 days. First to be done will be the construction of a 6,000-ft. tunnel. Estimated cost of the entire project is $1,250,000.

Southern California Notes

By KAY CAMPBELL

Initial steps towards making the work of **rehabilitating San Gabriel Dam No. 2** a Federal project and placing it under the supervision of United States Army Engineers were taken recently by the Los Angeles County Board of Supervisors. This rock-fill dam, built in 1932-33 at a cost of $3,000,000, has not yet been put to use, because of defects caused by settling.

An extensive new flood-control program has been planned for Los Angeles County with the help of PWA funds. The projects involved will cost approximately $20,220,000, of which one-fourth is to be borne by the County Flood Control District in addition to furnishing the plans and rights-of-way.

Approximately 97 per cent of the $1,835,000 Newport Harbor dredging project is done, according to R. H. Hildebrandt, engineer in charge, and will be finished in six weeks. **The Standard Dredging Company** has completed its share of the program in record time—more than three months ahead of schedule.

Colorado River Aqueduct Notes

By K. CAMPBELL

Griffith Company, Los Angeles, working on schedule 20-C near Lakeview, completed the first open work schedule to be finished on the Aqueduct. It consisted of 7,000 feet of monolithic concrete siphon, 12 feet 4 inches in diameter.

It is anticipated that actual construction of the 237-mile power transmission line to be built from Boulder Dam to the pumping plants of the Aqueduct will be started shortly. The total cost of the 230,000-volt power line which ultimately will carry 36 per cent of all the electrical energy generated at Boulder Dam, will be $2,256,204. The awards made recently were: **The Aluminum Company of America,** aluminum conductor and appurtenances, $614,316; **The Anaconda Wire and Cable Company,** 10 miles of copper conductor which will be used on the section across Danby Dry Lake, $37,246; **The Pacific Coast Steel Company,** steel towers, $402,330; **Fritz Zeibarth,** construction of the 237-mile line, $407,246. The construction of the line will take approximately two years' time and will employ in the neighborhood of 300 men, according to Aqueduct engineers.

All American Canal Notes

This snapshot comes from the All American Canal project in Southern California and shows one of **W. E. Callahan Construction Company** and **Gunther & Shirley's** two Bucyrus-Monighan 10-W draglines swinging a loaded bucket to the spoil bank. This machine, weighing 650 tons, carries a boom 175 feet long. The 12-yard bucket with its load weighs 50,000 pounds. The machine is operated by a 450-hp. Fairbanks-Morse Diesel engine with an auxiliary engine of 100-hp. for driving fans, oil and water pumps. A complete cycle of loading, swinging 180 degrees, dumping, and returning to the digging position requires about a minute and a half under average conditions.

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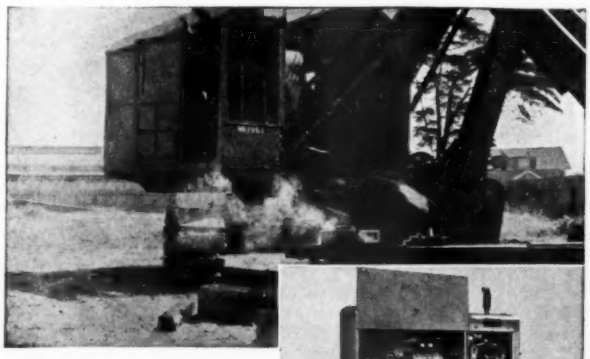

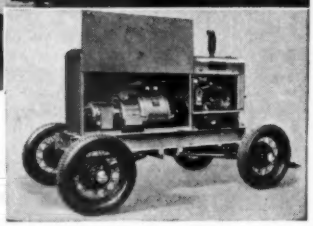

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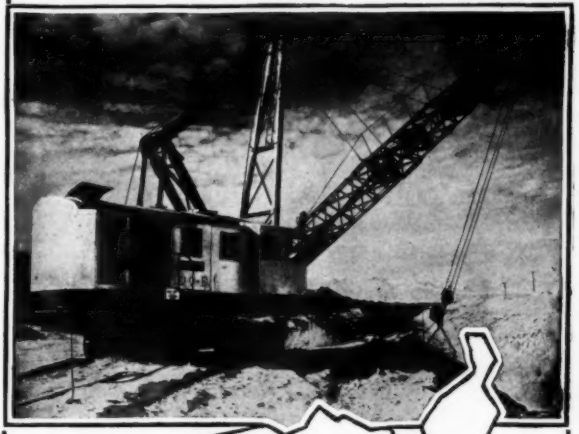
● *This Bucyrus-Erie model 100-B Electric Dragline is operating on the Colorado River Aqueduct of the Metropolitan Water District of Southern California.* Powered by Westinghouse.



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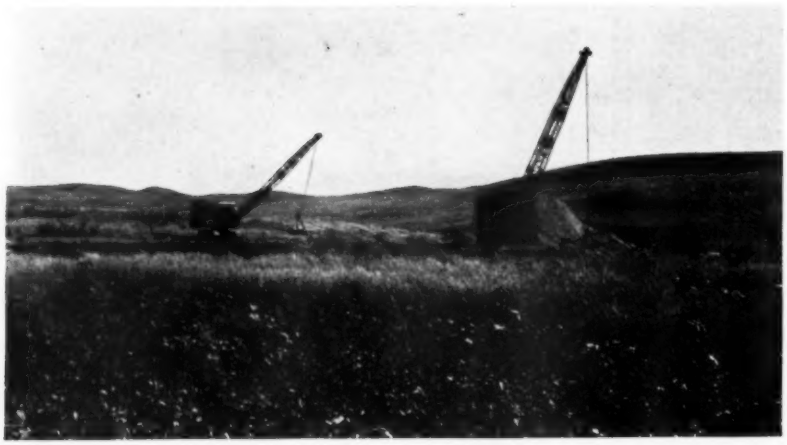
Fast Digging On Sutherland's Big Ditch

(Continued from page 508)



● *Here Morrison-Knudsen are using a Bucyrus-Erie 50-B and 1030 dragline in excavating for a bridge.*

what less than half the channel width to grade. The dragline, then moving to the opposite bank, completes the 25-foot bottom and the bank of the canal to a 1½ to 1 slope. Working around the clock, these two draglines have had none but minor interruptions for repairs, and have given a highly satisfactory account of themselves.

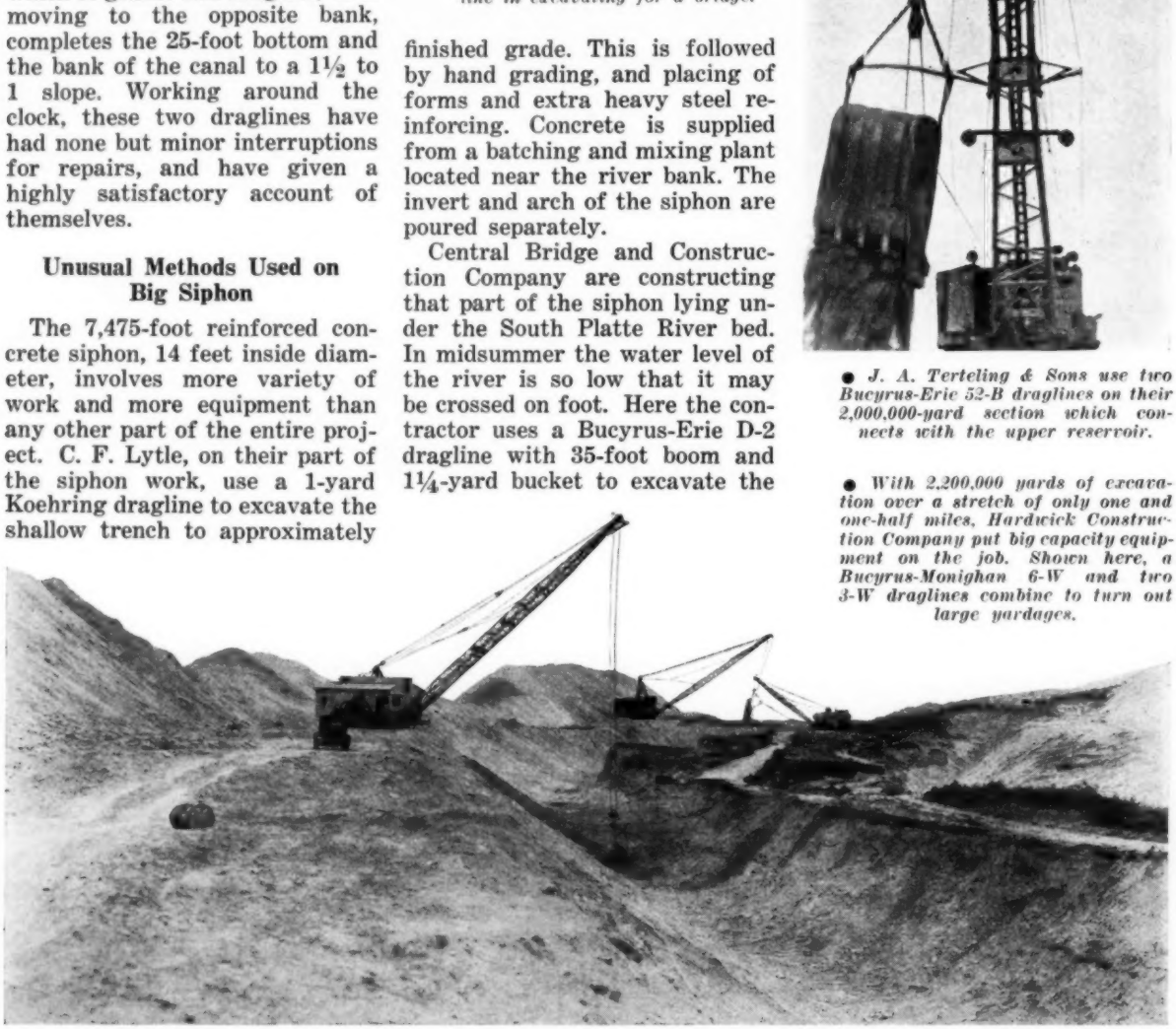
Unusual Methods Used on Big Siphon

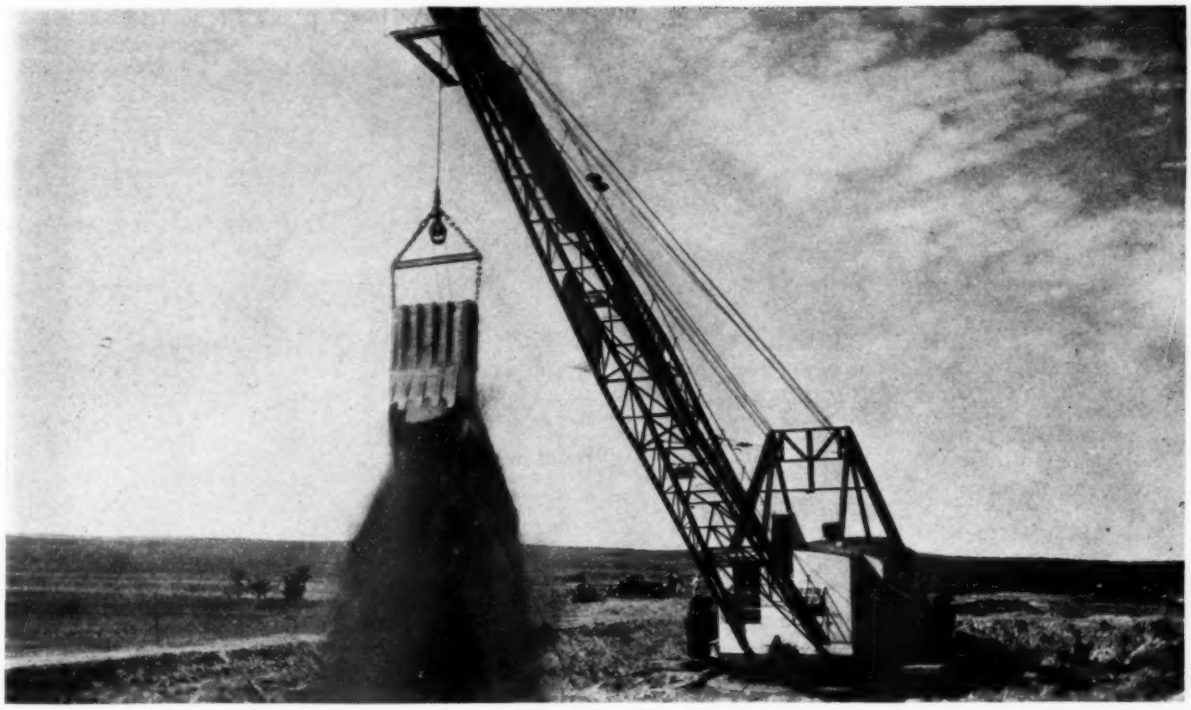
The 7,475-foot reinforced concrete siphon, 14 feet inside diameter, involves more variety of work and more equipment than any other part of the entire project. C. F. Lytle, on their part of the siphon work, use a 1-yard Koehring dragline to excavate the shallow trench to approximately finished grade. This is followed by hand grading, and placing of forms and extra heavy steel reinforcing. Concrete is supplied from a batching and mixing plant located near the river bank. The invert and arch of the siphon are poured separately.

Central Bridge and Construction Company are constructing that part of the siphon lying under the South Platte River bed. In midsummer the water level of the river is so low that it may be crossed on foot. Here the contractor uses a Bucyrus-Erie D-2 dragline with 35-foot boom and 1¼-yard bucket to excavate the ditch to grade. The ditch is kept dry by a Moretrench Wellpoint system. The wellpoints are driven at approximately 2-foot intervals, on either side of the route of the siphon. These are connected by pipe to a couple of powerful centrifugal pumps which keep the

● *J. A. Terteling & Sons use two Bucyrus-Erie 52-B draglines on their 2,000,000-yard section which connects with the upper reservoir.*

● *With 2,200,000 yards of excavation over a stretch of only one and one-half miles, Hardwick Construction Company put big capacity equipment on the job. Shown here, a Bucyrus-Monighan 6-W and two 3-W draglines combine to turn out large yardages.*





● *Fastest digger on this job, this Diesel-powered Bucyrus-Monighan 5-W dragline handles close to 200,000 yards per month for Morrison-Knudsen Company.*

area between the lines of points dry while work proceeds on the siphon.

Heavy Cut on North Bank

North of the South Platte River a ridge whose crest approximately parallels the channel is being cut through by Hardwick Construction Company of St. Louis, Missouri. This 2,200,000-yard contract, awarded at $339,307, requires movement of the sandy soil for 12.84c per cubic yard—highest priced dirt on the job. While the material is ideal for dragline excavation, the cut is so deep that it takes considerable ingenuity to remove the soil without rehandling which naturally would double excavating costs.

Finley Hardwick has charge of this job. Using a 6-W Bucyrus-Monighan with a 6-yard bucket and 125-foot boom, and a 3-W Bucyrus-Monighan with 3-yard bucket and 80-foot boom, both Diesel powered, he excavated 1,000,000 cubic yards in seven months, including the winter months. Another 3-W Monighan Diesel walker was recently placed on the job. These 3-yard Diesel-powered rigs are averaging 40 gallons of Diesel oil per 6-hour shift, during which time each moves in the neighborhood of 600 cubic yards; the resulting fuel cost at prevailing prices is $0.004 per yard.

An idea of the problem tackled

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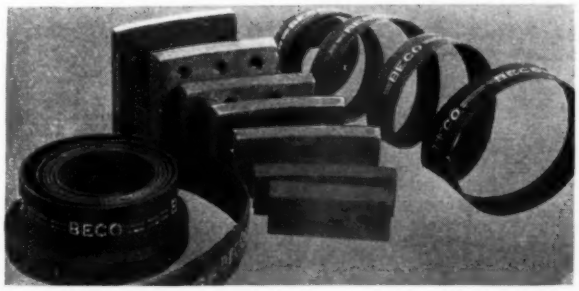

BECO Blocks and BECO Linings take hold with a smooth, firm accurate grip that means greater output for the machine and more confidence for the operator. Built for hard usage and long life on the most gruelling kind of excavator work, these blocks and linings not only perform better but last longer on the job. Durable and tough, they eliminate frequent replacements or adjustments, and . . . *keep your machines at work!* Let BECO Blocks and BECO Linings prove their economy to YOU—send for a trial order today.

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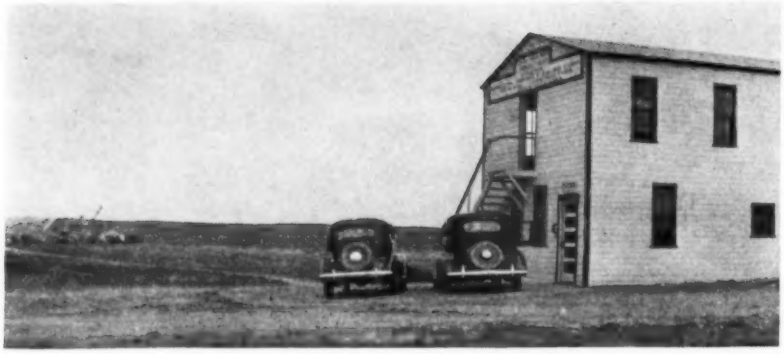


● *Shown here is the Western Asphalt Paving Corporation field office at the upper reservoir. To the left in the background may be seen the batching and mixing plant which supplies the concrete for paving the inner slope of the reservoir.*

by Hardwick Construction Company may be gained from the following figures. The route selected for the canal to cut through the ridge takes advantage of a dip in the crest, making the depth of cut at this point 124 feet. But because the banks of the canal have a 1½ to 1 slope the depth at the edge of the canal will be 164 feet. At the crest, therefore, each lineal yard of canal involves excavation and disposal of 2500 cubic yards of material.

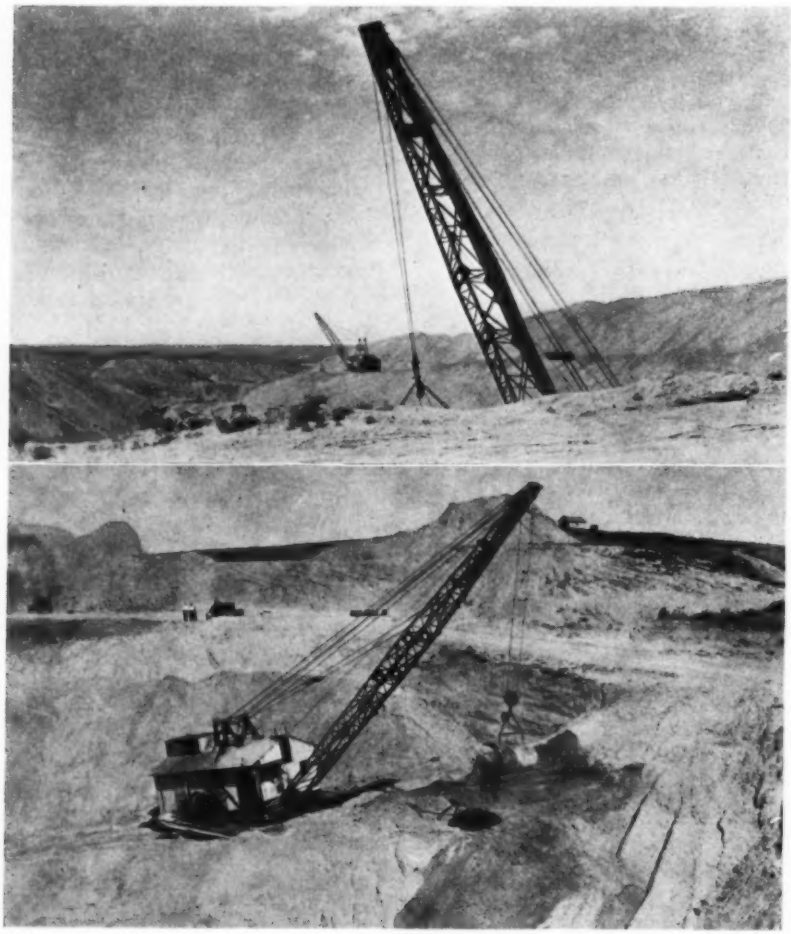
Dragline Produces Record Yardage

Dipping down over the back side of the ridge, we next come to one of the newest machines on the job, a Bucyrus-Monighan 5-W Diesel-powered walking dragline, working on the last two miles or so of the 7-mile section which Morrison-Knudsen Company has here. Working three 7-hour shifts per day, this dragline is finishing ditch at the rate of 180,000 to 200,000 cubic yards per month, accounting for 44 per cent of the total yardage this company is moving with 7 draglines on the

● *Morrison-Knudsen's 5-W dumps another big bucketful on the spoil bank and starts back for another load.*

various parts of the job. We learn from Superintendent Roberts that he is pleased with this performance.

A step or two away from this big 5-yard dragline, we practically stumble over a Bucyrus-Erie Type 1030 dragline, looking like a Scotch terrier pup beside a full-grown St. Bernard in comparison with its enormous cousin. This machine is employed by Central Bridge and Construction Company, digging ditch for one of



● *Top: The heaviest digging on the canal is found here on Hardwick's 2,000,000-yard contract. The 6-W in the background works from an embankment thrown up by the 3-W in the foreground as the cut approaches the crest of the ridge. Bottom: At the point where the canal crosses the ridge separating the North and South Platte River Valleys it will have a depth of 164 feet. Here 2500 yards must be dug for every lineal yard of advance.*

Famous Steels

SO GREAT was the skill of the Sword makers of Damascus and Toledo during the Middle Ages that their fame persists to this day. The swords they made for the knights of old looked much the same as any ordinary blade... but in toughness, balance, keenness-of-edge, they were so far superior to contemporary products that fighting men counted these swords as their most precious treasures.

Today, into the building of Bucyrus-Armstrong drilling tools, goes steel far superior to that from which these famed medieval smiths forged their blades. Tougher, stronger, better able to hold a cutting edge.

And just as outstanding for performance . . . long life . . . fast, efficient action are these Bucyrus-Armstrong tools. They deliver delay-saving, profit-making abilities that are worth many times their cost.

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Excavating, Drilling & Material-Handling Equipment, South Milwaukee, Wis.

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SAUERMAN
LONG RANGE MACHINES

Reach Any Distance up to 1,500 ft.
Dig Deep; Dump High
Low Operating Cost
Handle from 100 to 5,000 cu. yds. a day.

Sauerman Slacklines and Drag Scrapers are money-savers for the many projects that require movement of materials beyond the reach of boom machines. Write for Catalog.

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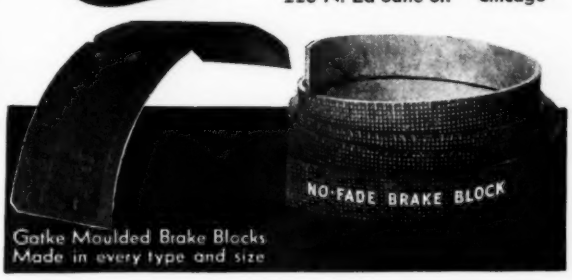

Gatke Moulded Brake Blocks
Made in every type and size

the numerous siphon and culvert contracts which are an inevitable part of the project. Further along, Morrison-Knudsen Company has a Bucyrus-Erie Type 1030 and a 50-B, both draglines, working on another bridge, flume, and siphon job.

Hard Digging on Terteling's Section

Beyond this 7-mile section where Morrison-Knudsen Company is working, the canal hangs to the edge of high bluffs above the North Platte River. Here J. A. Terteling & Sons have placed another new Bucyrus-Monighan 5-W Diesel-powered walker on the hardest digging encountered anywhere on the project. Of the 1,000,000 yards to be moved here, probably less than 5 per cent would technically be classified as rock. While much of it is sand, a large percentage is a hard cemented clay, so hard, in fact, that Operator Currie, after cussing and scratching at the darned stuff for his entire 6-hour shift, remarked, "Look at it, will you? How can you dig it? It may not be rock, but by God I'll bet it turns to rock before Friday!"

Well, drilling it might help some, and then again it might not. The main office of J. A. Terteling & Sons, in spite of many plaintive appeals from harassed operators, still feels the stuff is a bit too soft and seamy for effective use of dynamite or powder. The men will have to worry the material out as best they can.

● *Operator Dave Chatham and the E-2 dragline finish up a short section of outlet canal from the upper reservoir for Condon & Ward.*

Present progress made by all the contractors indicates that the canals and siphons between the diversion dam and the Sutherland reservoir will be completed by December 1, 1935.

This will permit the storing of water in the reservoir during the winter of 1935-36 and the project will be able to supply water for irrigation purposes during the summer of 1936. It is expected that the power house and transmission lines will also be completed and placed into service this coming summer.

The work is under the supervision of PWA with John Latenser, Jr., State Engineer PWA.

The Directors of the District are: A. F. Buechler, Horace J. Cary, C. H. Fisher, James Kunz, W. R. Maloney, Keith Neville, R. F. Stuckey and Harry L. Williams. The officers are: Harry L. Williams, President; Horace J. Cary, Vice President; W. R. Maloney, Treasurer; Gerald Gentleman, Secretary. Donald D. Price is Chief Engineer and General Manager; Parsons, Klapp, Brinckerhoff & Douglas of New York City are Consulting Engineers; C. Robert Fulton is Construction Electrical Engineer; C. J. McNamara is Construction Hydraulic Engineer; C. M. Coff is Office Engineer; E. Y. Grupe is Field Hydraulic Engineer.

Profit by comfort

TO increase your output, especially during the late hours of each shift, modernize your machines with Beco Seats. By providing lasting comfort for your operator, by insulating him from vibration, and because they are adjustable to the individual, these new seats enable your operator to handle levers rapidly, throughout the entire day, with a minimum of strain and fatigue.

Over even short periods, the comfort and proper support of a Beco Seat will pay big extra-output dividends on its small original cost. 1030

BUCYRUS-ERIE

Excavating, Drilling & Material-Handling Equipment «» South Milwaukee, Wis.

For your convenience in writing to Bucyrus-Erie, you will find a card bound in this issue.

Book Reviews

Drill Sharpener—A new **Ingersoll-Rand** bulletin No. 2176, describes two new pieces of equipment for the blacksmith shop—the 54 drill sharpener and the 27F oil furnace. The bulletin describes the features that have been developed for these tools, and in addition illustrates and lists the complete I-R line of sharpeners and low-pressure furnaces. A copy may be had by writing Ingersoll-Rand, 11 Broadway, New York City, or any branch office.

Soil Erosion Control — A 16-page booklet recently published by the **Austin-Western Road Machinery Company**, Aurora, Illinois, gives in detail methods of soil erosion control and application of Austin-Western terracers, blade graders, elevating graders, and other equipment to this work. A copy of this interesting booklet may be had by writing to the manufacturer.

Diesel Engines — A sixteen-page booklet has recently been issued by the **Murphy Diesel Company Ltd.**, Milwaukee, Wisconsin, which describes in detail the construction and design of the 6-cylinder Murphy Diesel engine. A copy may be had by writing the manufacturer.

Meeting Place of Capital and Labor
THE KOENIG LABOR AGENCIES
Established 1875
ST. LOUIS
612 Walnut St., Main 2766 and 2767
KANSAS CITY
501 Delaware St., Main 0796
HELP OF ALL KINDS FURNISHED FREE

Road Forms—The **Heltzel Steel Form & Iron Company**, Warren, Ohio, has announced that the following new bulletins describing products of their manufacture are ready for distribution: Road Form Bulletin No. 101 which describes in detail the Heltzel steel road forms; the Rapid Dowel and Expansion Joint Spotter, Bulletin Q-6; and the Heltzel Leveler Grader, Bulletin Q-7. Copies of these bulletins may be had by writing the manufacturer.

Diesel Power Units—Five new folders, covering the application of its Diesel power units to a wide variety of installations, have been issued by **Caterpillar Tractor Co.**, Peoria, Illinois. Diesel-electric generating sets; flour, feed and saw mills, pumping installations and gravel plants are the subjects of four of the mailing pieces. The fifth is devoted to a diversified list of machines such as excavators, cotton gins, industrial locomotives and in plants. Action pictures are featured with cost, operating and fuel saving information on each job. Copies of these interesting folders may be obtained from "Caterpillar" Distributors or the manufacturers.

Slackline Scrapers—A very complete 56-page catalog covering their complete line of long range machines has just been published by **Sauerman Bros. Inc.**, 474 S. Clinton Street, Chicago. The catalog contains 145 illustrations and is the first to present the entire line, previous catalogs having been devoted to each specific type of machine. The book is complete with capacity tables and operating data pertaining to drag scrapers, slackline cableways and scrapers, tautline cableways, coal storage and bulk storage scraper systems. A copy may be had by writing to the manufacturer and asking for catalog No. 17.

Man Wanted

Man to take care of stationary Diesel, compressor, and low pressure steam plant. Must be general handy man and be able to do own repairs. This is a small granite cutting plant. Also, must be willing to turn his hand to other work. Man between 24 and 40 preferred. Steady job to the right man.

Rock of Ages Corporation,
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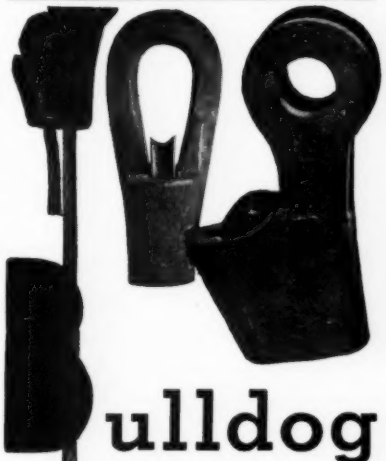

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Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

DRAGLINE-SHOVEL-CLAMSHELL OPERATOR

18 years' experience on general excavating construction and coal mining desires position as shovel or dragline operator. Capable of operating all types and sizes of machines. Best acquainted with Bucyrus 50-B, 30-B, D-2, 225-B steam; Northwest draglines; P&H 206, 600, 400; Lima 101, 404, 601; and Monighan 2-T, 3-T. Can do own repair work and can take charge of equipment if desired. Was superintendent four years for one company. Can furnish good references. Age 34, married. Have operated floating dredges but prefer shovel or dragline work. Available immediately. Will go anywhere for right price and reliable company. Present location, Indiana. Box 7403.

EXPERIENCED DRAGLINE-CLAMSHELL-SHOVEL OPERATOR

Experienced operator desires work anywhere. Has had 15 years' on dragline work, 4 years' operating clamshell machine and 2 years' on a shovel. Experienced on railroad grading, sand and gravel, and general excavating construction work, principally operating steam machine, but has had three years' operating electric, 2 years' on gasoline and 1 year on Gas+Air machine. Prefers large Bucyrus-Erie any type: steam or electric power. Can furnish best of references from former employers. Age 40. At present located in Western New York. Box 7301.

SHOVEL OPERATOR

Five years' experience on Bucyrus-Erie Gas+Air on basement excavation, highway and street grading. Also eight years experience on Erie, Marion, Bucyrus steam shovels. Will go anywhere. Can do own repairing. A-1 reference. Sober and reliable. Present location Minnesota. Box 7501.

EXPERT DRAGLINE AND SHOVEL OPERATOR

16 years' experience as shovel operator. Married, 36 years of age. Have operated practically all makes of machines, and have 10 years' experience as dragline operator. Can handle steam, Diesel, electric or gasoline machine. Have worked on highway and railroad grading, rock excavation in quarry, drainage and irrigation and dredging and also gold dredging. Prefer position on Bucyrus-Erie E-2, D-2, or 50-B or other Bucyrus-Erie machines. Have also operated Class 220 and 225 electric and Diesel electric machines. Capable of taking charge of repairing and erecting and can handle crews. Best of references and can do own repairing. At present located in California, but will go anywhere. Box 5507.

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15 years' experience on Erie, Keystone and Osgood gas machines. Can do own repair work. Willing to go anywhere in U. S. A. Box 7200.

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34 years' experience on Bucyrus, Osgood, Thew, Erie, Marion, Bay City steam or gas machines in rock quarry, coal stripping, R. R. ditching and grading. Can do own repairing and furnish excellent references. Married. Present location, West Virginia. Box 7402.

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Have 14 years' experience as foreman and superintendent of quarries. Age 34. Will take stock in company as part of monthly salary. Married. Willing to go anywhere. Box 7601.

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Twelve years' experience on steam shovels, clamshells and locomotive cranes—excavating, pile driving, steel erection work. Can do own repairing. Age 30 and single. A-1 references. Present location, New York. Box 7603.

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Twenty years' experience, ten of this contracting. Exceptional record for producing results; dams, sewers, hydro-power developments, mountain roads not paving, tunnels, bridges, factories; some quarry work. Graduate C. E.; fluent Spanish, some Portugese and German; 8 years in foreign countries. Would consider profit-sharing basis. References. Box 7602.

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EXCAVATING ENGINEER Bargain Counter

★ ★ ★ THE ITEMS LISTED on these pages have been selected because they offer unusual values to the man who is looking for a bargain. Some of this equipment is surplus stock which has never been used, some is rebuilt and carries new equipment guarantee, some is just plain used. But every item is priced for quick sale. If any of this equipment fits your needs send a postcard or letter, mentioning the reference number, to *Bargain Counter, Excavating Engineer, South Milwaukee, Wisconsin.* We'll pass your inquiry along to the owner and you will receive price and complete information promptly. Act now — with advancing prices on new stock this equipment will move fast.

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½ CU. YD. DIPPER, 16' boom, 13'8" dipper handle. Shovel equipment suitable for type "A" shovel. NEW. SE-30.

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¾ CU. YD. DIPPER—23' BOOM—12'6" DIPPER HANDLE—Shovel Equipment suitable for 20-B Gas or Diesel. NEW. SE-15.

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1½ CU. YD. DIPPER—27' BOOM——17' DIPPER HANDLE—High Lift Rope Crowd Shovel Equipment suitable only for Bucyrus-Erie 43-B machines. Rebuilt—New Machine Guarantee. SE-23.

1 1⅝ CU. YD. DIPPER, 30' boom, 19' handle, high lift shovel equipment—Will fit 50-B. New. SE-33.

1 1¾ CU. YD. DIPPER, 22' boom, 16' handle, shovel equipment—Will fit 43-B. New. SE-34.

Skimmer Scoop

⅝ CU. YD. DIPPER—20' Boom together with all necessary ropes and material to completely convert Bucyrus-Erie 1020 Shovel, Clamshell or Dragline to Skimmer Scoop Machine. NEW. Shipment 2 to 3 weeks. SS-1.

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35' CHANNEL BOOM, FAIRLEAD AND ROPES but not including bucket. For use on Model D-2—20-B—31-B. NEW. DL-2.

40' CHANNEL BOOM, FAIRLEAD AND ROPES, but not including bucket. For use on Model D-2—20-B—31-B. NEW. DL-3.

BRAND NEW Ropes included with each of above Dragline Equipments.

Trench Digging Equipment

1 CU. YD. 42½" WIDE—Solid type Dipper—24' Boom and all auxiliary equipment. Will dig maximum depth 22'. For application to GA-2 or GA-3 Shovel. Rebuilt—New Machine Guarantee. DS-5.

BRAND NEW PAGE, two dippers each ¾ cu. yd., one 38" wide over cutters, the other 49½" wide over cutters. 17'1½" Boom and all necessary auxiliary equipment. Will fit Bucyrus-Erie 1030 or 1035. DS-7.

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1 7'6" 1030 TUNNEL—Complete. New. H-1.
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1 9'0" 31-B TUNNEL (two sticks). New. H-3.
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1 9'6" 20-B TUNNEL (two sticks). New. H-5.
1 9'6" 31-B TUNNEL (two sticks). New. H-6.
1 12 0" 18-B—Complete. New. H-7.
1 12'6" D-2, 31-B—Complete. New. H-8.
1 12'6" D-2, 31-B—Complete. New. H-9.
1 13'0" 1020—Complete. New. H-10.
3 13'0" 1030—Complete. New. H-11.
1 15'0" 20-B OIL (two sticks). New. H-12.
3 15'0" E-2, 41-B—Complete. New. H-13.
1 15'0" 43-B—Complete. New. H-15.
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2 16'0"—43-B—Complete. New. H-17.
1 17'0"—TYPE "A"—Complete. New. H-18.
1 17'0"—20-B HIGH LIFT—Complete. New. H-19.
1 17'0"—37-B—Complete. New. H-20.
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3—23' 20-B DIESEL, GAS OR ELECTRIC SHOVEL BOOM—New. JA-7.
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2 ¾ CU. YD.—Rock Type—Will fit 20-B. New. D-15.

1 ⅞ CU. YD.—Plate Front—Will fit 1030 or 1035. New. D-18.

1 ⅞ CU. YD.—Ins. Tooth—Will fit 1030. New. D-47.

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1 1¼ CU. YD. — Ins. Tooth — Will fit 37-B. Used. D-52.

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1 2 CU. YD.—Manganese—Will fit 43-B. New. D-62.

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2 2 CU. YD.—BECO HEAVY DUTY. 5400 lbs. New. DB-24.

3 2¼ CU. YD.—BECO TYPE "U". 3850 lbs. New. DB-13.

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1 2½ CU. YD.—BECO TYPE "X". 6800 lbs. New. DB-25.

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1 5 CU. YD.—MONIGHAN HEAVY DUTY. 12000 lbs. New. DB-16.

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1 6 CU. YD.—BECO TYPE "X". 14400 lbs. New. DB-29.

1 7 CU. YD.—MONIGHAN TYPE "W". 13700 lbs. New. DB-18.

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50 KW MOTOR GENERATOR SET—GENERAL ELECTRIC—consisting of 75 H.P. induction motor, 3 phase, 60 cycle, 440 volt, connected to 50 KW, 250 volt—1200 RPM Generator, includes suitable rheostat and compensator. NEW. EE-2.

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3 24-INCH GAUGE 3-TON BALDWIN GASOLINE LOCOMOTIVES, Model AL, Type 2. Price very favorable. L-1.

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1 NB—3 STAGE CENTRIFUGAL PUMP—2" suction and discharge—bronze impeller and shaft—capacity 100 gallons per minute at 240' head operating at 1720 RPM or 270' head at 1780 RPM. Now equipped for belt drive but can be operated by 15 HP Electric Motor. ME-6.

ENGINES

Designed especially for application to Excavating or similar Equipment. Can be used for stationary or semi-stationary service.

Diesel

2—140 H.P. NEW, NON-REVERSIBLE ATLAS DIESEL ENGINES—5 cylinder, 9" bore x 10½" stroke, 514 R.P.M., 4 cycle, vertical overhead valves, dust proof, oil tight crank case and forced lubrication. Includes auxiliary air starting equipment. DE-2.

1—45 H.P. NEW, NON-REVERSIBLE ATLAS DIESEL ENGINE—4 cylinder, 6" bore x 8" stroke, 650 R.P.M., 4 cycle, vertical, overhead valves and forced lubrication. DE-5.

3—110 H.P., NEW, NON-REVERSIBLE ATLAS DIESEL ENGINES—6 cylinder, 7" bore x 8½" stroke, 600 R.P.M., 4 cycle, vertical, overhead valves and forced lubrication DE-6.

Steam

1 12½"x16" link reversing type for Railroad Shovel. ME-1.

2 4½"x5" reversible—20.8 H.P. at 400 R.P.M. 100 lb. Pressure. ME-2.

1 4¾"x5" reversible—23.2 H.P. at 400 R.P.M. 100 lb. Pressure. ME-3.

1 5"x5" reversible—25.6 H.P. at 400 R.P.M. 100 lb. Pressure. ME-4.

BOILERS

NEW

Will Make That Old Shovel Work Like New.

Can also be used for Miscellaneous Service

Vertical Type

2 46½"x110"—40 H.P.—155 lb. Working Pressure. Special Wood Burning Fire Box. ASME Std. Will fit any B-2 or B-3. B-9.

Locomotive Type

3 44'x17'—75 H.P.—125 lb. Working Pressure. ASME Std. Will fit Model 68-C. B-13.

1 44"x18'—88 H.P.—125 lb. Working Pressure. ASME Std. Will fit Model 70-C. B-14.

1—70"x12'—136 H.P. 175 lb. working pressure. ASME, and Mass. Std. Will fit 120-B. B-18.

AIR COMPRESSORS

1 BRAND NEW WORTHINGTON—METAL-WELD—2-cylinder 7"x6" Vertical 162 cu. ft. piston displacement, Air Compressor. Fitted with Laidlaw feather valves—Lugs on side for mounting on skids or channels—Shaft extended and equipped with semi-flexible coupling to take 2⅝" drive shaft—Force feed lubrication. Automatic control. Includes 1" High capacity centrifugal circulating pump—"V" belt driven—18"x41" Air Receiver, 100 pounds working pressure. A.S.M.E. Standard. Electric or gasoline power required approximately 30 H.P., approximately 1000 R.P.M.—Compressor Speed approximately 550 R.P.M.—Overall dimensions: Height 45"—length 37½"—width 28". AC-3.

2 11"x11"x12" STEAM DRIVEN LOCOMOTIVE TYPE, Westinghouse air compressors with with fittings. NEW. AC-1.

1 11"x11"x12" STEAM DRIVEN LOCOMOTIVE TYPE, Westinghouse air compressors with fittings. Used. Make offer. AC-2.

Trade Notes

The Chain Belt Company, Milwaukee, Wisconsin, recently announced the appointment of **F. H. Burlew Company**, 221 West Huron Street, Chicago, as an exclusive distributor of Rex construction equipment in the Chicago area. The new distributor has been identified with the construction machinery industry in the vicinity of Chicago for many years. A complete line of Rex mixers and pumps will be carried in stock.

W. S. Hardwick Construction Company, Hardwick and Horton, and Hardwick and Company announce the removal of their offices from the Sterick Building, Memphis, Tennessee, to 1602-4 Arcade Building, St. Louis, Missouri.

According to announcement of **Caterpillar Tractor Co.**, Peoria, Ill., Paul Weeks, for the past four years manager of its Washington office, succeeded Walter H. Gardner as manager of the Special Sales Division when Mr. Gardner left the company on October 1st, to become General Sales Manager of Keystone Steel & Wire Co. Assisting Mr. Weeks will be C. L. McMullen, in charge of engine sales to manufacturers, and G. E. Spain, in charge of power unit sales to distributors and engine dealers. The Special Sales Division, of which Mr. Weeks is the new head, was organized four years ago to merchandise the Company's Diesel and gasoline engines and special tractor assemblies. Since that time, over thirty manufacturers have adopted Caterpillar engines, and hundreds of sales have been made to individual owners.

FOR SALE

RATES:	First insertion rate per column inch	Repeat insertions (no change in copy) rate per column inch
Up to 3 inches	$4.50	$4.00
Over 3 and up to 7 inches	4.25	3.75
Over 7 inches	4.00	3.50

Rates are net (no commissions, no discounts) and payable in advance of publication. Send your remittance with insertion order and copy.

Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

Small Shovels
Under 2 Yards

LIMA MODEL 101—Combination 1¼ yard shovel and 40' plus 10' extension Dragline—powered with gasoline engine Model JK 6½" x7"—4 cylinder. Shovel equipment practically new. Located Colorado. Box 599-SS.

MARION TYPE 32 STEAMER, Shop No. 5676, 18' boom, 15' dipper handle, 1¼-cu. yd. dipper shipped May, 1926, good operating condition. Box 451-SS.

BUCYRUS-ERIE 35-B ELECTRIC 24' BOOM, 16' Dipper Handle, 1½ cu. yd. Dipper, 3 phase, 25 cycle, 440 volt, Cat mounted. Box 544-SS.

LORAIN—75-A—One and one-quarter cubic yard Gasoline Shovel. Good condition. Located Chicago. Box 676-SS.

LORAIN—MODEL 60—One cubic yard Gasoline Shovel. Good condition. Located Chicago. Box 677-SS.

BUCYRUS-ERIE LATE MODEL B-2 STEAM HIGH LIFT SHOVEL. 1 yard dipper—single shaft cat mounting. Good condition. Located near St. Louis. Box 518-SS.

MARION MODEL 450—1¼ Cu. Yd. Steam Shovel, Cat Mounted. New Gears on Caterpillar recently installed. Price favorable. 536-SS.

NORTHWEST MODEL 105 SHOVEL. Bargain Price. Located Texas. Box No. 566-SS.

NORTHWEST NO. 4—24' Boom, 16' Dipper Handle, 1 yard Dipper—Gasoline—Located eastern New York. Good condition. Box 600-SS.

TYPE B BUCYRUS-ERIE HIGH LIFT STEAM SHOVEL. 21'3" Boom, 18'4" Dipper Handle, ¾ cubic yard inserted Tooth Dipper—Power Boom Hoist—Boiler Feed Pump—Caterpillar Mounted. Located Chicago. Box 699-SS.

B-2 BUCYRUS-ERIE HIGH LIFT STEAM SHOVEL. 24' Boom—18'4" Dipper Handle—¾ yard Inserted Tooth Dipper—Boom Hoist—Caterpillar Mounted—Good operating condition. Located Chicago. Box 700-SS.

BUCYRUS-ERIE 20-B COMBINATION STEAM SHOVEL - CLAMSHELL - DRAGLINE. Good working condition. Caterpillar Mounted. Located near Peoria, Illinois. Box 701-SS.

BUCYRUS-ERIE GA-2—Gas-Air Combination High Lift Shovel and 50' Boom Dragline Equipment, mounted on Single Shaft Cat. Good operating condition. Located at Shawnee, Okla. 537-SS.

BUCYRUS-ERIE MODEL B-2 High Lift Steam Shovel. Caterpillar mounted. Good working condition. Located northern New Jersey. Price very reasonable. Box 643-SS.

BUCYRUS-ERIE MODEL B-2 High Lift Steam Shovel. Caterpillar mounted. Very good working condition. Located South Carolina. Box 644-SS.

BUCYRUS-ERIE GA-2 SHOVEL, NO. 9918, 22' Boom, 16' Dipper handle, 1 cu. yd. manganese steel front inserted tooth dipper, 20-10 Gas Air single shaft drive, caterpillar mounted, 6¼x8", 4 cyl. Waukesha Motor. Weight 71,900 lbs. Reconditioned. Located Greensboro, N. C. Price $5000.00. Box 595-SS.

BUCYRUS ERIE GA-2 Gas-Air High Lift Shovel—24' Boom, 16' Dipper Handle, 1¼ cu. yd. Dipper, Single Shaft Cat, Electric Starter. Waukesha 4-cylinder 6¼"x8" Gasoline Engine. Reported excellent condition. Located West Virginia. 593-SS.

THEW LORAIN MODEL 75 SHOVEL. 24' Boom, 18' dipper handle, 1¼ cubic yard dipper. Gasoline. Machine now operating. Located central New York State. Box 665-SS.

BUCYRUS-ERIE TYPE B STEAM COMBINATION SHOVEL-CLAMSHELL AND STEAM HOE. Machine completely rebuilt 1929. Good operating condition. Located near Boston. Box 517-SS.

GENERAL ½ cubic yard Gasoline Shovel—including 30' Boom Clamshell and Dragline Equipment—New 1931—powered with Buda DW6 High Altitude Gasoline Engine. Excellent condition. Located near Denver. Box 588-SS.

BUCYRUS-ERIE GA-2 HIGH LIFT SHOVEL. 24' Boom—18'4" Dipper Handle, 1 cubic yard Inserted Tooth Dipper. Also includes Forward Drum and Gearing and mechanism for clamshell operation including 45' boom. Also 1 cubic yard Williams clamshell bucket. Waukesha WL Engine. Good operating condition. Located Chicago. Box 702-SS.

BUCYRUS-ERIE 43-B GASOLINE CHAIN CROWD SHOVEL — 23' boom — 17' dipper handle—1½ cubic yard Vanderhoef dipper and teeth—electric starter—standard single shaft cat. Operated less than six months. Excellent appearance and condition. Will be demonstrated by owner. Located vicinity New York. No. 512-SS.

BYERS MASTER SHOVEL — 26' Boom, 17' Dipper Handle, 1¼ cu. yd. Dipper, New January 1931. Good working condition. Located Melvern, Kansas — Highway 75 south of Topeka. Price very favorable. 591-SS.

BUCYRUS-ERIE GA-2 Gas-Air Extra High Lift Shovel—24' Boom, 18'4" Dipper Handle, 1¼ cu. yd. Dipper, Single Shaft Cat. Electric Starter. Excellent condition. Located eastern Pennsylvania. 592-SS.

BUCYRUS-ERIE—42-B Steam Shovel. Caterpillar Mounted, 21' Boom, 15' Dipper Handle, 1⅛ Cubic Yard Dipper, Power Boom Hoist. This machine excellent mechanical condition. Located Birmingham, Alabama. Can be demonstrated. Box 531-SS.

BUCYRUS-ERIE TYPE B STEAM SHOVEL, cat. mounted, equipped with 19'6" boom 16' dipper stick and ¾ yard dipper, in good working order. Located near Hudson, Pennsylvania. Price $1750.00. Box 493-SS.

BUCYRUS-ERIE 41-B STEAM SHOVEL: 21' boom, 15' dipper handle, boom hoist, dipper trip, 1¼ cu. yd. Vanderhoef dipper, cat mounting, now located and can be demonstrated at Colchester, Conn. Very favorable price. Box No. 532-SS.

BYERS BEAR CAT—⅝ yd. Gasoline Shovel—Recently overhauled — Located Birmingham, Alabama. Box 480-SS.

FOR SALE

Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

P & H MODEL 600—1 yd. Gasoline Shovel—including 40' boom dragline equipment without bucket. Waukesha Engine. Recently overhauled. Located in Alabama. Box 483-SS.

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1 **BUCYRUS-ERIE B-2** Steam ⅞ yard High Lift Shovel—Cat Mounted. Good operating condition. Located near Boston. Make offer. Box 521-SS.

BUCYRUS-ERIE 42-B STEAM SHOVEL—late model, 21' boom, 15' dipper handle, 1½ cu. yd. Vanderhoef dipper, boom hoist, dipper trip. Massachusetts standard boiler, cat mounting. Good operating condition. Now located and can be demonstrated at Colchester, Conn. Box No. 533-SS.

BUCYRUS-ERIE GA-2 Gas-Air High Lift Shovel. 24' Boom, 18'4" Dipper Handle, 1 cubic yard Dipper. Single shaft cat. Waukesha four cylinder gasoline engine. Excellent operating condition. Located North of Chicago. Box 645-SS.

BUCYRUS-ERIE GAS+AIR—22' Boom, 16' Dipper Handle, 1¼ cubic yard Dipper, Waukesha 6¼"x8" four cylinder gasoline engine. Single Shaft Cat mounted. First class condition. Located eastern New York. Box 601-SS.

BUCYRUS-ERIE Steam Combination Shovel and Clamshell Machine. Single shaft cat mounted. ¾ cubic yard Williams Clamshell Bucket included. Excellent mechanical condition. Located Virginia. Box 672-SS.

BUCYRUS-ERIE GAS-AIR TYPE GA-2 HIGH LIFT SHOVEL — 22'6" boom — 16' dipper handle—1¼ yard cast front inserted tooth dipper—single shaft caterpillar mounting—electric starter. Excellent condition. Field reconditioned. Waukesha 4-cylinder 6¼x8" engine — New cylinder blocks and piston rings. Located near Scranton, Pennsylvania. Will demonstrate. Box 508-SS.

LORAIN MODEL 75 Combination 1¼ cu. yd. shovel and 50' boom dragline. Powered by Waukesha four cylinder 7¾" x 8" gasoline engine. Located Eastern Pennsylvania. Box 693-SS.

BROWNHOIST MODEL NO. 2 ½ cu. yd. rope crowd gasoline shovel or clamshell. Waukesha four cylinder engine in good operating condition. Bargain price. Located near Peoria, Illinois. Box 689-SS.

BYERS-BEARCAT — Combination Shovel—Pull Shovel and Lifting Crane; Half swing. Gasoline power. Excellent condition. Located Detroit, Michigan. Box 690-SS.

GENERAL COMBINATION SHOVEL-CRANE. Shovel Boom and Handle rebuilt. A-1 shape. ⅝ yard Dipper. 35' Crane Boom. 12 New Cat Tread Links. Cat mounting and general condition machine—good. Located Georgia. Price very reasonable. Box 578-SS.

BUCYRUS-ERIE — DIESEL-AIR — COMBINATION SHOVEL AND DRAGLINE. 22'6" Boom—16' Dipper Handle—1¼ cubic yard Inserted Tooth Dipper. 45' Boom Complete Dragline Equipment without bucket. Engine—Atlas Diesel. Located Oklahoma. Good operating condition. Box 703-SS.

BAY CITY MODEL S—1¼ cubic yard Gasoline Shovel. Located near Boston. Box 705-SS.

MEAD MORRISON—⅝ **CUBIC YARD GASOLINE SHOVEL.** Good operating condition. Located near Boston. Box 706-SS.

2—TYPE GA-2 BUCYRUS-ERIE COMBINATION SHOVEL AND CRANES.
1—NORTHWEST 105 COMBINATION SHOVEL AND CRANE. Bargain prices. Located at Wilkes-Barre, Pa. Box 712-SS.

BUCYRUS-ERIE 41-B STEAM SHOVEL—21' Boom, 15' Dipper Handle, 1¼ cu. yd. Dipper, Power Boom Hoist, Cat mounted. Located New York City. Box 545-SS.

TWO (2) MODEL 301 STANDARD KOEHRING MACHINES good operating condition. Now operating and can be inspected in southwestern Ohio. Price, $3,000.00 each. Box 540-SS.

LINK-BELT MODEL K-42 1¼ **YARD GASOLINE SHOVEL.** Waukesha Model WL 6¼"x 8" 4-cylinder Engine—new blocks and pistons this year. Good working condition. Located Colorado. Box 738-SS.

BUCYRUS-ERIE B-2 EXTRA HIGH LIFT STEAM SHOVEL. 21'3" Boom, 16' Dipper Handle, 1 cubic yard cast front inserted tooth Dipper. Single Shaft Cat. Fair operating condition. Boiler very good. Located New York. Box 715-SS.

BUCYRUS-ERIE B-2 HIGH LIFT STEAM SHOVEL. 19'9" Boom, 16' Dipper Handle, ⅞ cubic yard inserted tooth Dipper. Two speed propelling gear. Located Boston. Box 716-SS.

BUCYRUS-ERIE B-2 EXTRA HIGH LIFT STEAM SHOVEL. 21'3" Boom, 16' Dipper Handle, ⅞ cubic yard inserted tooth Dipper. Single Shaft Cat. Located Boston. Box 717-SS.

BUCYRUS-ERIE GA-2 COMBINATION SHOVEL AND DRAGLINE. 22'6" Shovel Boom, 16' Dipper Handle, 1 cubic yard cast front inserted tooth Dipper. 50' Dragline Boom including Fair leads but not Bucket. Air Starter. Good condition. Located Newark. Box 718-SS.

BUCYRUS-ERIE 41-B STEAM SHOVEL. 21' Boom, 15' Dipper Handle, 1¼ cubic yard Dipper. First class operating condition. Located New York. Box 719-SS.

LORAIN 75-B COMBINATION SHOVEL AND DRAGLINE. 1¼ cubic yard Shovel Equipment. 50' Dragline Boom, without bucket. Waukesha 6¾"x8" four cylinder gasoline engine. Excellent condition. Located eastern Pennsylvania. Box 720-SS.

TWO LORAIN 75-B COMBINATION 1½ CUBIC YARD SHOVEL AND 50' BOOM DRAGLINES — without buckets. Gasoline power. Good working condition. Located eastern Pennsylvania. Box 721-SS.

LORAIN 75-B 1½ **CUBIC YARD SHOVEL.** Gasoline power. Good working condition. Located eastern Pennsylvania. Box 722-SS.

MARION MODEL 21 ELECTRIC—M.G. SET ¾ **YARD SHOVEL.** Good condition. Located eastern Pennsylvania. Box 725-SS.

BUCYRUS-ERIE 37-B GASOLINE 1½ **YARD CHAIN CROWD SHOVEL.** Electric Starter. Excellent condition. Used only eight months. Located Connecticut. Box 732-SS.

P&H MODEL 300 SHOVEL—18' Boom, 15' Dipper Handle, ⅝ cubic yard Dipper, manganese front. Powered with Waukesha B U 4½"x6¼" engine, power clutch control. First class operating condition. Located Massachusetts. Box 665-SS.

P&H MODEL 600—1¼ **CUBIC YARD GASOLINE SHOVEL.** Will be put in good operating condition. Located eastern Pennsylvania. Box 664-SS.

FOR SALE CHEAP
Marion Model 440 Gas Shovel and Dragline, 1 cubic yard capacity. For sale cheap. Located Missouri. Box 634-SS

BUCYRUS-ERIE GA-2 HIGH LIFT SHOVEL—24' boom, 16' dipper handle, 1¼ cubic yard dipper, on single shaft cat. Electric starter, Waukesha 4-cylinder 6¼"x8" gasoline engine. Reported excellent condition. Located Virginia. Box 623-SS.

BUCYRUS-ERIE — FACTORY REBUILT — 1½ **YARD CHAIN CROWD SHOVEL.** Wisconsin D-3 6-cylinder 5½"x6½" Gasoline Engine. Kohler 1½-KW Light Plant installed. Low price. Dragline equipment also available. Box 737-SS.

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2 **INSLEY** ¾ **YARD GASOLINE SHOVELS.** Located eastern New York State. Bargain prices. Box 574-SS.

OSGOOD MODEL 18 Steam—¾ yard shovel—Cat mounted. Just completely overhauled. Excellent condition. Located near Indianapolis, Ind. Box 522-SS.

MARION 1 YARD STEAM SHOVEL
Box 575-SS.

⅝ YARD SHOVEL
Universal ⅝ yard gasoline shovel—¾ swing. Good operating condition. Located Northern Michigan. Box 636-SS

BUCYRUS-ERIE B-2 STEAM SHOVEL, Cat Mounted. 19'9" boom, 16' dipper handle, 1 cubic yard dipper. Good running condition. Located, Minnesota. Box 621-SS.

BUCYRUS-ERIE TYPE B STEAM SHOVEL, Cat mounted, 19'6" boom, 14' dipper handle, ¾ cubic yard dipper. also 36' clamshell boom and front drum and gearing. Located Kanses City, Missouri. Box 622-SS.

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Excavating Engineer
South Milwaukee, Wisconsin

BUCYRUS-ERIE GA-2 Gas-Air—Extra high lift 24' boom—18' 4" dipper handle, 1 cu. yd. dipper. Single shaft cat mounting—air starter. Good condition. Located near Hartford, Conn. Box 523-SS.

1—Type B Bucyrus-Erie Combination High Lift Shovel and 40' Clamshell Machine.
1—Type B Bucyrus-Erie High Lift Shovel.
2—Type B-2 Bucyrus-Erie High Lift Shovels. All located western Connecticut. Operating condition. Entire lot very low price. Box 573-SS.

KOEHRING MODEL 601 SHOVEL. Cat mounted. 24' boom, 18' dipper handle, 1½ cubic yard manganese front dipper. 20" Cat treads. Wisconsin 6-cylinder Model E, 6"x7" gasoline engine. Located Maryland. Box 631-SS.

TWO KOEHRING MODEL 502 COMBINATION SHOVELS AND CRANES. Each equipped 21' boom, 16' dipper handle, 1¼ cubic yard dipper, 50' crane boom with 10' removable insert. Kohler light plant driven by 4-cylinder gasoline engine. Excellent condition. Only handled one job. Shovel equipment has seen very little service. Located Philadelphia. Box 632-SS.

LIMA 101 GASOLINE 1¼ **YARD SHOVEL.** Located eastern Pennsylvania. Good operating condition. Price reasonable. Box 576-SS.

P&H—MODEL 600—Combination 1 yard shovel and 40' boom dragline including dragline bucket. Waukesha gasoline engine. Machine in fair operating condition. Located Georgia. Box 695-SS.

NORTHWEST MODEL 105—1 YARD GASOLINE SHOVEL. Fair running order. Located Georgia. Bargain price. Box 579-SS.

FOR SALE

Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

Small Shovels
Under 2 Yards
Continued

UNIVERSAL—MODEL NO. 35—½ cu. yd. shovel and 28' boom clamshell including ½ cu. yd. Owens clamshell bucket. Powered by Waukesha four cylinder 4½" x 6¼" gasoline engine. Engine completely overhauled this year. Entire machine put in first class shape. Excellent condition. Located North Carolina. Box 696-SS.

BUCYRUS-ERIE — FACTORY REBUILT — 1¼ YARD GASOLINE ROPE CROWD SHOVEL. Wisconsin D-3 6-cylinder 5½"x6½" gasoline engine. Kohler 1½-KW light plant installed. Extremely low price. Dragline equipment available. Factory guarantee. Available December 1 to 15. Box 736-SS.

LORAIN MODEL 75 1¼ YARD GASOLINE SHOVEL. Waukesha Engine. Good working condition. Located eastern Pennsylvania. Box 734-SS.

INSLEY ⅜ YARD GASOLINE COMBINATION SHOVEL AND BACK HOE. Half swing. Steel Cab. Good condition. Located Central Pennsylvania. Box 735-SS.

TYPE "R" INSLEY SHOVEL—½ yard capacity—Full revolving. Cat mounted. New 6-cyl. Waukesha motor. 45 HP. First class mechanical condition. Ready to go to work. Very favorable price. Located Milwaukee. Box 629-SS.

P&H MODEL 700—1½ cubic yard shovel. Powered with Waukesha 150 h.p. Ricardo head 7½"x8" gasoline engine. Good operating condition. Located New Mexico. Box 652-SS.

BUCYRUS-ERIE 43-B GAS SHOVEL—22' boom, 16' dipper handle, 1¾ yard inserted-tooth dipper. Electric starter, Wisconsin 6 cylinder 6x7" engine. Reconditioned—first class condition. Located New York. Box 617-SS.

Small Draglines
Under 2 Yards

BUCYRUS-ERIE 20-B COMBINATION STEAM DRAGLINE - CLAMSHELL - SHOVEL. Good working condition. Caterpillar Mounted. Located near Peoria, Illinois. Box 701-SD.

BUCYRUS-ERIE GA-2 COMBINATION DRAGLINE AND SHOVEL. 50' Dragline Boom including Fairlead but not Bucket. 22'6" Shovel Boom, 16' Dipper Handle, 1 cubic yard cast front inserted tooth Dipper. Air Starter. Good condition. Located Newark. Box 718-SD.

OSGOOD GASOLINE MODEL NO. 4 50-FOOT BOOM 1¼ YARD DRAGLINE including Bucket. Engine Wisconsin D-4 6-cylinder. Excellent condition. Located central Pennsylvania. Box 733-SD.

BUCYRUS-ERIE—FACTORY REBUILT—37-B 40' BOOM DRAGLINE. Wisconsin D-3 6-cylinder 5½"x6½" Gasoline Engine. Kohler 1½-KW Electric Light Plant installed. New machine guarantee. Available December 1 to 15. Either 1½ yard chain crowd or 1¼ yard rope crowd shovel equipment available. Box No. 736-SD.

LINK-BELT MODEL K-44 45' BOOM PLUS TWO 10' AND ONE 5' EXTENSIONS—TOTAL 70' DRAGLINE WITHOUT BUCKET. Gasoline power. Includes 800 Watt Kohler Light Plant. Located near Chicago. Good operating condition. Box 723-SD.

BUCYRUS-ERIE — DIESEL-AIR — COMBINATION DRAGLINE AND SHOVEL. 22'6" Boom—16' Dipper Handle—1¼ cubic yard Inserted Tooth Dipper. 45' Boom—Complete Dragline Equipment without bucket. Engine—Atlas Diesel. Located Oklahoma. Good operating condition. Box 703-SD.

LORAIN 75-B COMBINATION DRAGLINE AND SHOVEL. 50' Dragline Boom without Bucket. 1¼ cubic yard Shovel Equipment. Waukesha 6¾x8" four cylinder gasoline engine. Excellent condition. Located eastern Pennsylvania. Box 720-SD.

2 LORAIN 75-B COMBINATION DRAGLINES AND SHOVELS. 50' dragline booms without buckets. 1½ cubic yard shovel equipment. Gasoline power. Good working condition. Located eastern Pennsylvania. Box 721-SD.

LINK-BELT 1 CUBIC YARD CAPACITY 50' BOOM DRAGLINE WITHOUT BUCKET. Gasoline power. Reported good operating condition. Located near Chicago. Box 724-SD.

TWO P&H 700 DRAGLINES. 1½ cu. yd. buckets on 50' booms. Gas and Diesel. Located Lower Rio Grande Valley, Texas. Box 618-SD.

LORAIN MODEL 75 Combination 50' boom dragline and 1¼ cu. yd. shovel. Powered by Waukesha four cylinder 7¾" x 8" gasoline engine. Located Eastern Pennsylvania. Box 693-SD.

P&H—MODEL 600—Combination 40' boom dragline and 1 yard shovel including dragline bucket. Waukesha gasoline engine. Machine in fair operating condition. Located Geor— Box 695-SD.

BUCYRUS-ERIE — 43-B GASOLINE — COMBINATION DRAGLINE AND CLAMSHELL—1¾ cubic yard Bucket capacity—no bucket. Good condition. Located Arizona. Box 704-SD.

P&H MODEL 775—70' BOOM DRAGLINE including 1½ and 2 yard Omaha Buckets. Extra long Crawler. Excellent mechanical condition. No repairs needed. Located near Memphis. Box No. 489-SD.

P & H MODEL 206 GASOLINE DRAGLINE—38' boom. Waukesha engine. Located Eastern Pennsylvania. Fair condition. Bargain price. Box 711-SD.

Small Clamshells and Cranes
Under 2 Yards

BUCYRUS-ERIE 20-B COMBINATION STEAM CLAMSHELL - DRAGLINE - SHOVEL. Good working condition. Caterpillar Mounted. Located near Peoria, Illinois. Box 701-SCC.

BUCYRUS-ERIE — 43B GASOLINE — COMBINATION CLAMSHELL AND DRAGLINE—1¾ cubic yard Bucket capacity—no bucket. Good condition. Located Arizona. Box 704-SCC.

ORTON 24' BOOM—½ CUBIC YARD CLAMSHELL MACHINE. ½ cubic yard Owen Clamshell Bucket. Hercules 55 HP. Gasoline Engine. Factory rebuilt 1932. Good operating condition. Located Tennessee. Box 709-SCC.

BYERS—BEARCAT—Half swing Clamshell Machine including bucket. Located vicinity Chicago. Bargain price. Box 674-SCC.

BAY CITY "PUP" CLAMSHELL MACHINE. Good operating condition. Box 514-SCC.

NORTHWEST MODEL 105 Gasoline—40' boom clamshell. Good operating condition. Located Iowa. Box 516-SCC.

BYERS BEARCAT 25' BOOM CLAMSHELL (¾ swing) and ½ cu. yd. Clamshell Bucket, including Trench digging attachment carrying ½ cu. yd. dipper. 24" wide over cutters—will dig maximum 15'. Good operating condition. Very attractively priced. Located vicinity of Wilkes Barre, Pennsylvania. Box 494-SCC.

BUCYRUS-ERIE 1030 GASOLINE 40' BOOM CLAMSHELL MACHINE. Cat mounted. No Bucket. Recently overhauled. Guaranteed. Located Kansas City. Box 543-SCC.

BYERS BEARCAT CLAMSHELL—Crane—30' boom. Will handle ½ cubic yard bucket. Located near Grand Rapids, Mich. Box 648-SCC.

UNIVERSAL—MODEL NO. 35—28' boom clamshell and ½ cu. yd. shovel including ½ cu. yd. Owens clamshell bucket. Powered by Waukesha four cylinder 4½" x 6¼" gasoline engine. Engine completely overhauled this year. Entire machine put in first class shape. Excellent condition. Located North Carolina. Box 696-SCC.

O & S MODEL "T" ¾ yard clamshell machine. 40' boom. Good working condition. Powered with Climax 5½"x7" gasoline engine. Located near St. Louis. Good working condition. Box 651-SCC.

If You Do Not Find What You Want Listed—Write Us

Excavating Engineer
South Milwaukee, Wis.

Large Shovels and Draglines
2 Yards and Over

50-B STEAM SHOVEL, Number 3946; equipped with 1½-cubic-yard dipper, 26-foot boom, also 1½-cubic-yard dragline bucket with 50-foot boom caterpillar mounted, equipped for burning oil, located at Texarkana, Ark. Price $3,000. Box 112-LSD.

68-C BUCYRUS ELECTRICALLY OPERATED SHOVEL, equipped with 2½-yard manganese front dipper, 3 phase, 60-cycle, 440-volt motors, transformers, cable, reel and approximately 1400 feet of cable all in excellent condition. Reasonable price. Address Box 268-LSD.

FOR SALE

CLASS 14 STEAM DRAGLINE with 2-yard Page bucket. Location Iowa. Very good condition. Surprisingly low price f.o.b. cars

ALSO

2-YARD MONIGHAN STEAM DRAGLINE in fair condition—cheap.

Box 419-LSD.

MARION MODEL 350 W. L. SHOVEL. New 1923. 90' boom, 56' handle, 6 yd. dipper, 3 phase, 60 cycle, 2300 volts, series motors. Has handled about 1,000,000 yds. stripping. Good condition Price approximately $50,000.00 f.o.b. cars, Iron Range. Box 656-LSD.

TYPE 175-B ELECTRIC, No. 794 equipped with 87' shovel boom, 48' dipper handle, 3½-yd. bucket, and dragline equipment including 125' boom, and 3½-yd. bucket. This machine was recently reconditioned and is in good operating condition. Present, location, Connecticut. Box 263-LSD.

100-B STEAM SHOVEL, 3 yd. dipper, location Eastern Canada. Immediately available. Used—good condition.

Box 669-LSD.

MONIGHAN DRAGLINE MODEL T, 2-cubic-yard 60-foot boom located near Wichita, Kansas. About seven years old. Has recently been thoroughly overhauled. Box 180-LSD.

FOR SALE

Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

BUCYRUS 320-B STEAM STRIPPING SHOVEL, shop number 4205, new in 1925, used less than four years. Located at Toronto, Ohio. Box 74-LSD.

70-C BUCYRUS STEAM SHOVEL on Cats. Complete. In operating condition. Shop number 1712. Also one extra three-yard Manganese dipper and sticks. Chicago territory. Box 347-LSD.

FOR SALE OR RENT
TWO CLASS 14 STEAM DRAGLINES, caterpillar mounted, equipped for burning gas or oil. Located, Southwest. Price approximately $4,000 each. Box 619-LSD.

Locomotives

LOCOMOTIVES

3 BALDWIN, 17x24, straight drive standard gauge 45 ton locomotives. 54 inch boilers. Shop numbers from 32,750 to 34,611. Each one has passed State Boiler Inspection yearly. Boilers will stand cold water test of 240 lbs. At present in actual service in Minnesota mine. Box 152-ME.

For Sale or Rent

Two 40-ton, 6-wheel switchers. Recently overhauled and rebuilt. Two 50-ton 6-wheel switchers. In excellent condition. Location Chicago. Box 306-ME.

Locomotive Cranes

TWO AMERICAN STEAM LOCOMOTIVE CRANES. Each 8 wheel—25 ton capacity. Each equipped with 8¼"x10" double cylinder engine. Boom 50'. Steam brakes and train air line. Boiler 54"x101" ASME—130 pounds pressure. Standard gauge 4'x8½". Used only eight months. Splendid condition. Box 628-ME.

BROWNING — 8 wheel Locomotive Clamshell Crane — 45' Boom — 1 cubic yard Clamshell Bucket. Steam power. Good condition. 15 ton capacity. Located Chicago. Will sell cheap. Box 678-ME.

If You Do Not Find What You Want Listed—Write Us

Excavating Engineer
South Milwaukee, Wis.

The Bargain of the Year

ONE COMPLETE NARROW GAUGE DIRT MOVING OUTFIT including camps, shop and haulage equipment. Located near Fort Wayne, Indiana. Can you use it?

54 Steel bunks with mattresses and bedding. Mattresses and bedding are sewed up in burlap.
6 Heating stoves.
50 Shovels and picks, approximate.
1 Fairbanks Morse gasoline engine and 5x5 bulldozer pump 3 HP.
2 Fairbanks Morse gasoline engine and 3x5 bulldozer pump 1½ HP.
4 Track jacks, 15 ton.
3 Track jacks, light.
1 Duplex Pump—Worthington, 5¼x3½x5.
10 Slips.
1 Anvil.
1 Forge.
6 Switches.
4 Frogs.
10 Switch points.
2 Each, scythes, hand saws, cant hooks, spike malls.
1 Carbide light.
1 Kitchen outfit.
30 Western dump cars, 5-yard.
1 36x84" vertical boiler.
1 6" centrifugal pump with upright engine attached.
2 Galvanized water tanks, wagon size.

Will consider individual sale of separate items.

Address Box 449 ME.

Miscellaneous Equipment

LOADMASTER—MODEL MD—Wheel type, 16' boom, starter, lights, and Ross steering gear. In service loading freight cars for 17 months. New August 1, 1933. Completely rebuilt with new engine parts, new tires, hoist clutches, etc. Guaranteed like new. Reasonably priced f. o. b. Chicago. Box 684-ME.

AUSTIN-MAMMOTH Leaning Wheel Senior Grader Blade—12'—with scarifier. New 1930. Used only 60 days. Good condition. Box 679-ME.

COMPLETE CONTRACTORS EQUIPMENT

Offered for sale by Southern contractor. Priced to sell.
7—Railroad Type Steam Shovels 2½ to 5 yd.
3—Full Revolving Shovels, ¾ yd.
1—Gasoline Clamshell Crane, ½ yd.
2—Jordan Spreaders.
2—Locomotives, 26 Ton, American Saddle Tank.
32—12-yd. Western Heavy Duty Dump Cars.
1—Flat Car.
3—Camp Cars.
2—1-bag Gasoline Concrete Mixers.
Pumps, Boilers, Jacks and Other Tools.
For further particulars, Address Box 138-ME.

BRAND NEW PAGE DRAG SHOVEL EQUIPMENT suitable for application to Bucyrus-Erie 1030, 1035, or 32-B machines now in the field, consisting of 17'1½" boom, 11' dipper handle, and two ¾ cubic yard dippers; one 38" wide over cutters—the other 49½" wide over cutters, together with auxiliary A frame and ropes. Priced below cost. Box 683-ME.

MONARCH—ALLIS-CHALMERS MODEL 75 gasoline powered caterpillar tractor. Bought 1930. Used about 60 days. Just like new. Bargain price. Box 681-ME.

7 LINN TRACTORS, 2 "50" DIESEL CATERPILLAR BULLDOZERS, 10 BULL-DOG MACK DUMP TRUCKS. All ready for work. Attractive Price. Location, Pennsylvania. Box 731-ME.

Stripping Proposition

VERY ATTRACTIVE COAL STRIPPING PROPOSITION. High grade semi-anthracite coal located in Arkansas coal fields. If interested in putting an outfit on either contract, royalty or stock split basis, all maps, prospecting data, etc., are on file with T. M. Porterfield, 516 Martin Building, Birmingham, Alabama.

DIPPERS—2½ CU. YD.

2—2½ cubic yard dippers for 70C Bucyrus steam shovel. One of these dippers is in good condition and the other has not been used since being rebuilt. Has set new Westico teeth. For particulars write Foley Brothers, Inc., New York Building, St. Paul, Minn.

WANTED—⅝ CU. YD. CLAMSHELL BUCKET Indiana Contractor desires good used clamshell bucket, ⅝ cu. yd. capacity. In writing please give make, type (state if digging or re-handling bucket), location, condition and price. Box 714-ME.

4—75 DIESEL CATERPILLAR TRACTORS.
4—EUCLID DUMP WAGONS. Located eastern Pennsylvania. Box 710-ME.

NEW 50-B ROPE CROWD BOOM, 35' long and 16' dipper stick (no dipper), for 50-B Diesel shovel. Price $500. Box 638-ME.

HELTZEL TRAILER BATCHING BIN with volumetric measuring containers, conveyor belts and gasoline driven concrete mixer. New 1927—used very little. Bargain. Box 682-ME.

PARTS—175-B Shovel—PARTS

1 Main Engine
1 Boom
1 Dipper Shaft
1 Crowding Engine
1 Five Yard Dipper

If interested in making a good buy on these shovel parts, write us. Box 607-ME.

COMPLETE EQUIPMENT for 2 strip mines, contractors or quarry operations, No. 300 and No. 36 Marion steam shovels, well drills, locomotives, cars, crushers, picking tables, loading booms, cable and button retarders, compressors, motors, transformers, flood and search lights, camp equipment and new repair parts for above. Box 195-ME.

4 LA PLANT CHOATE 6-yard, all-steel, dump wagons. Equipped with wide iron wheels. Price $100.00 each. Chicago territory. Box 349-ME.

WANTED

½ OR ¾-YARD NORTHWEST OR P & H CRANE with boom and dragline equipment.

Also

½ or ¾-YARD DRAGLINE BUCKET AND FAIRLEAD for P & H 300. Box 730-ME.

Bargains in Contractors' Equipment

1—TWO-DRUM AMERICAN ELECTRIC HOIST, 150 H.P., 440 V, 3-phase, 60 cycle, 212 amp.
3—THREE-DRUM LIDGERWOOD STEAM HOISTING ENGINES, 8x10, Nat'l Board Boilers
4—SWINGING ENGINES, Lidgerwood 6x8, and Mead-Morrison
2—SCRAPER BUCKETS, 3 cu. yd. Sauerman, and 5 cu. yd. American
1—10-TON DRAVO STEAM WHIRLER
2—14" CENTRIF. PUMPS, 6000 g.p.m., with Climax R-4-U gas engines
1—55-YARD, 2-COMPARTMENT HELTZEL TRAILER-TYPE BIN
1—80-YARD, 2-COMPARTMENT JOHNSON BIN, with batchers
2—24" GAUGE BROOKVILLE GAS LOCOMOTIVES
1—120-FOOT MAST ENSLEY HOIST AND ELEVATOR
2—20-TON, 100-FOOT BOOM EICKLEY STIFF LEG DERRICKS, new
LARGE ASSORTMENT SMALL TOOLS, drills, busters, pumps, blocks, steel erection tools, etc. Located at Wilkes-Barre, Pa. Box 713-ME.

Not in the Contract

Stranger at crossroads store: "Who's the close-mouthed fellow over there in the corner? He hasn't spoken a word for the last fifteen minutes."

Another Village Loafer: "Him? That's Pete Blackmore. He ain't close-mouthed—he's jess waitin' the storekeeper to bring back the spittoon."

Dr.: "You have acute appendicitis."

Elsie: "Don't get fresh! I came here to be examined, not admired."

Two fellows in a car went through the automatic signals and were stopped by a policeman.

"I'm sorry," said the driver, quick-wittedly, "but I happen to be a doctor. I'm taking a patient to the asylum in a hurry."

The officer was suspicious and looked penetratingly at the passenger. But he, too, was quick-witted, and looking up at the policeman with a seraphic smile, whispered, "Kiss me, Sergeant." They got away with it.

Young Husband (proudly): "My baby can say 'da-da'!"

Bachelor: "Mine can say 'Sugar-daddy,' 'highball,' and 'step on it'!"

Contractor (to applicant for job as bookkeeper): "I am inclined to give you the position if you understand the double-entry system of bookkeeping."

Applicant: "I do, indeed! At my last place I had to keep a triple-entry system—a set for the active partner, showing the real profits, a set for the sleeping partner, showing small profits, and a set for the income tax officials, showing no profits."

Curious: "What do you repair these shoes with?"

Cobbler (looking up very sharply): "Hide!"

Curious: "Why should I hide?"

Cobbler: "Hide, hide! The cow's outside."

Curious: "Let her in—I'm not scared."

"I don't like the way you're holding that gun."

"Well, I don't aim to please."

"Has your wife changed very much since you married her?"

"Yes—my habits, my friends and my hours."

A negro came in to a border town in Ohio on election day. In the afternoon an acquaintance met him. "Have you voted, Rastus?"

"Yassir, I's voted."

"How did you vote?"

"Well, boss, it was dis way. I meets a Republican on de street, an' he gibs me 'leven dollars to vote his ticket. An' I meets a Democrat, an' he gibs me seven dollars to vote his ticket. So I voted for the Democrat."

"But the Republican gave you the most money."

"Yassir, dat's just de pint. I voted for dem Democrats 'cause dey is de least corrupt."

Patricia: "Harry surprised me by telling me that we're going to take our honeymoon in France."

Nellie: "How nice! And how did he spring it on you?"

Patricia: "He said as soon as we were married, he would show me where he was wounded in the war."

"Captain, is this a good ship?"

"Why madam, this is her maiden voyage."

Repairs were being carried out on the roof of the asylum by a local builder, who had asked for an inmate to assist him.

All went well until lunch time, when the builder's assistant clutched him round the neck, and with a terrible laugh said: "Come on, let's jump off."

The builder was frightened almost out of his life, but suddenly he had an inspiration:

"Oh, hell!" he replied, "anybody could do that. Come down and let's jump up."

Boss (to office boy arriving a half hour late): "You should have been here at eight o'clock!"

Office boy: "Why, what happened?"

Customer: "I wish to buy an appropriate gift for a bride—something timely and striking."

Merchant: "How about a clock?"

"So your brother is a painter, eh?"

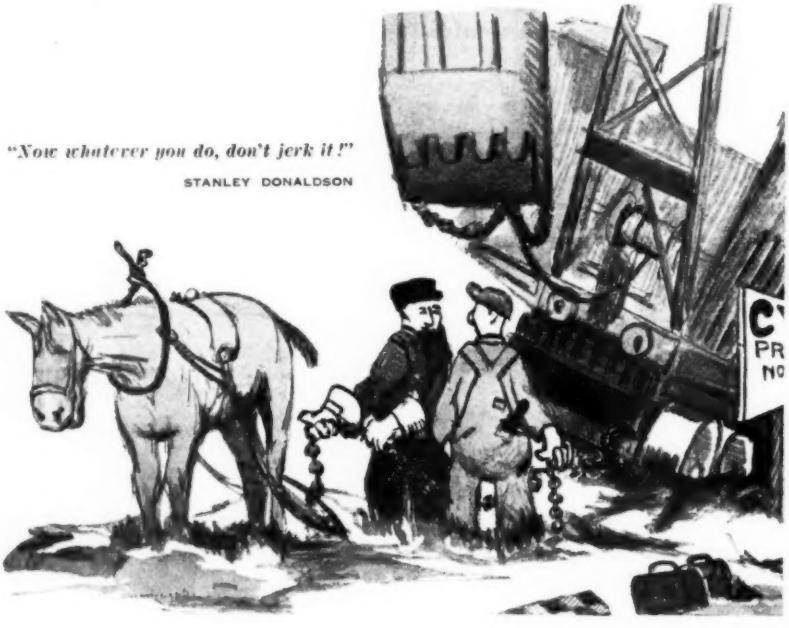
"Yep."

"Paints houses, I presume?"

"Nope, paints men and women."

"Oh, I see, he is an artist."

"Nope, just paints 'women' on one door and 'men' on the other."

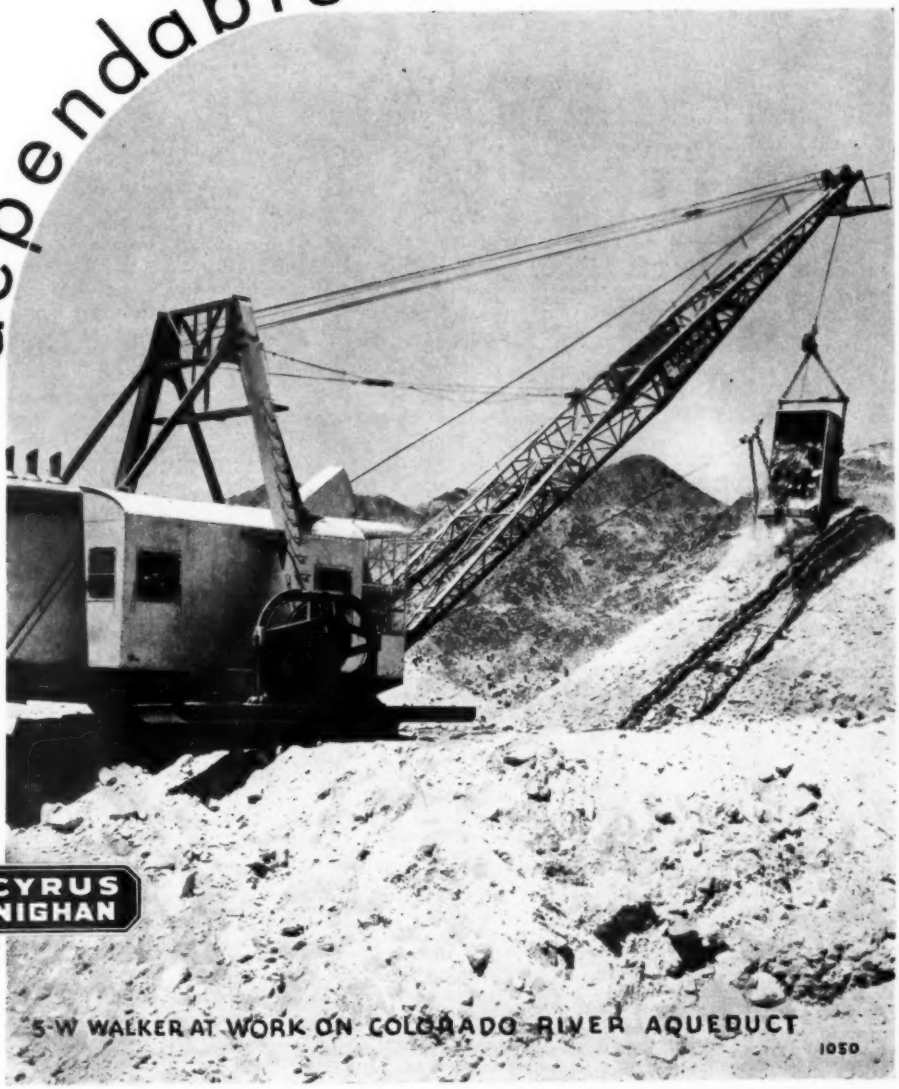


"Now whatever you do, don't jerk it!"

STANLEY DONALDSON

THE Bucyrus-Monighan Walker is dependable from a mechanical standpoint—that's basic and to be expected. But its movement and operation are also exceptionally dependable because of its large-area walking-traction treads and separate circular base. It gives dependable output more days per year, because it moves and digs on soft footing which would otherwise cause delays and reduce yardage output. As shown in the picture, it works effectively and safely at the very edge of the bank. Its low center of gravity and the wide spread of A-frame and the boom base contribute to increase still further its stability and dependability. Investigate this machine for your next dragline job. Manufactured by Bucyrus-Monighan Company, Chicago, Illinois.

dependable



BUCYRUS MONIGHAN

Sold by

BUCYRUS-ERIE

EXCAVATING, DRILLING, AND MATERIAL-HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN

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Headquarters and Works: LINCOLN, ENGLAND
London Office, Imperial House, 15, 17, 19, Kingsway, W. C. 2

ABYSSINIA: W. H. Miles, Esq., 41, Osmond Road, Hove, Sussex, England.
AUSTRALIA: Ruston & Hornsby (Australia), Pty., Ltd., Melbourne, Sidney and Brisbane.
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Works: Chicago, Ill.

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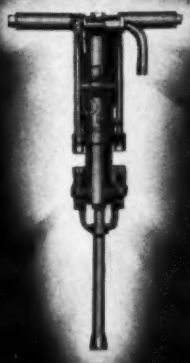
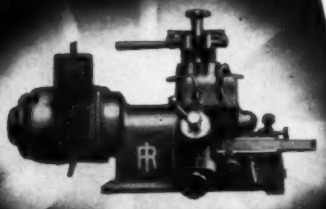
Bright Spots on any Job



"Jackhamer" Drill.

"Jackbit"

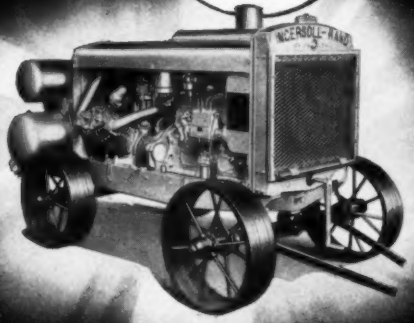


The "Jackbit" Grinder.

Watch these machines perform. They are bright spots on any job. Where they are in use you will find the work going ahead at full speed, with efficiency and satisfaction.

Each machine is built to stand up and do its part—they are the leaders of their class. They can be depended upon for low operating cost and low maintenance expense.

Complete information on these and many other I-R machines is contained in Catalog 1604-E. It will be of value to all who are contemplating any construction or maintenance work. A copy is yours for the asking.



The Two-Stage Air-Cooled Portable Compressor.

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